



**NDT PRODUCT CATALOG**



## **NONDESTRUCTIVE TESTING EQUIPMENT**

### **WELCOME**

Thank you for taking the time to review our catalog. We have tried to coordinate an extensive line of nondestructive testing equipment and supplies from only the highest quality manufacturers. In the pages to follow you will see the best names in the industry and the widest selection of equipment and accessories available in the NDT discipline of Radiography.

**SELECTION** – This is our X-ray Catalog that lists the most common items in the NDT method of Radiography. We have a complete General Catalog containing products in all other NDT methods that we will be happy to send you on request.

**QUALITY** – We strive to sell only the highest quality products at a very competitive price. If you are not 100% satisfied with any product that you have purchased please let us know so we can correct the situation.

**TECHNICAL STAFF** – All of our staff is well trained in NDT and the use of our products. Please call if you have any questions about the use or operation of any product, or if you need assistance in the selection of a product.

**DELIVERY** – We have a fully stocked warehouse facility. We handle a large inventory of NDT accessories and we can deliver many items from stock the same day.

Lastly, we handle everything from six hundred thousand dollar systems to six-cent lead letters. While it is impossible to have a catalog sheet on everything we sell, we will make this pledge: "If you use it within the course of nondestructive testing or training, you can buy it from DETEK."

The staff and management of DETEK, Inc. are ready and able to serve you whatever your NDT needs. Call us at 1-800-638-0554.

Thank you,

DETEK, Inc.

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**





# NONDESTRUCTIVE TESTING EQUIPMENT

## **GEIT**

### **KRAUTKRAMER ULTRASONICS**

- thickness gauges
- flaw detectors
- phased array detectors
- hardness testers
- inspection systems
- transducers & phased array probes
- test blocks
- training

### **SEIFERT X-RAY EQUIPMENT**

- portable & stationary systems
- real time systems
- x-ray film and chemistry
- darkroom equipment
- automatic film processors
- x-ray cabinets
- radiation safety devices
- complete line of accessories

### **DIGITAL RADIOGRAPHY**

- CR and DR filmless radiography
- film digitization & archiving
- digital imaging software

## **HOCKING EDDY CURRENT**

- portable phase display instruments
- single & multifrequency instruments
- crack detectors
- standard and custom probes
- in-line inspection systems
- ferro-magnetic tubing instruments
- conductivity instruments and standards
- bondtesters

## **RAYCHECK**

### ***Ultrasonic and Radiographic***

- ultrasonic test blocks
- pennies, blocks, and shims

## **ITI**

### ***REMOTE VISUAL INSPECTION***

- flexible fiberoptic borescopes
- focusing rigid borescopes
- ccd camera systems
- crawlers and rovers
- retrieval tools

## **SHERWIN**

### ***DUBL CHEK DYE PENETRANTS***

- visible and fluorescent dyes
- water washable/solvent removable
- self and post emulsifiable
- removers and cleaners
- developers - wet and dry

## **GOULD-BASS**

### ***MT / PT SYSTEMS***

- transportable MPI units
- power packs
- wet horizontal units
- modular penetrant process systems

## **PARKER RESEARCH**

### ***MAGNETIC PARTICLE***

- "contour probe"
- yokes, prods, coils
- portables (450-2000 amps)
- powders and concentrates
- black lights and meters

## **DEFELSKO**

### ***POSITECTOR COATING GAUGES***

- ferrous and non-ferrous substrates
- conductive and non-conductive coatings
- micro-processor based

## **LOGOS IMAGING**

### ***DIGITAL IMAGING SYSTEM***

- portable CR imaging system
- pulsed x-ray equipment

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**

**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



## **NONDESTRUCTIVE TESTING EQUIPMENT SALES POLICIES**

DETEK appreciates that you have considered making us your NDT supplier. We are dedicated to supplying you with quality service. Below is a summary of our basic sales policies.

### **FOR YOUR RECORDS**

DETEK, Inc. is a veteran owned small business incorporated in 1971 in Maryland. Our Federal ID # is 52-0940685, DUNS# 07-482-1497. We are CCR registered, CAGE Code 53404. We collect sales taxes in NJ, PA, MD, VA, and NC.

### **C.O.D. POLICIES**

For those who prefer to purchase on a C.O.D. basis, rather than an open account, our policies are as follows: There are charges for shipping and handling as well as a C.O.D. charge. Refusal of a C.O.D. package will result in suspension of C.O.D. service to the customer. Subsequent orders will have to be prepaid. We also accept all major credit cards. Cards are not charged until goods are actually shipped.

### **OPEN ACCOUNT**

Customers completing the credit application and providing the proper credit references may be granted open account status. Please allow 3 days to process your request for credit terms. Billing is by invoice. Payment is due in 30 days from date of invoice. Past due accounts are subject to late charges and/or credit hold. **It is our policy to require a written Purchase Order from all new accounts on the first order.** This allows us to insure your billing, shipping and taxable status is entered correctly in our computer. Please supply a written tax certificate with your order if you are tax exempt. Our minimum order is \$50.00. Complete terms are described on the attached Terms and Conditions of Sale (CT-726).

### **SHIPPING CHARGES**

UPS charges for shipping, insurance, hazardous materials (penetrant and x-ray chemistry) will be prepaid and added to your invoice. Motor Freight and Air Freight (other than UPS) we prefer to ship "freight collect". If we must ship prepaid we ask that the freight invoice be paid within 10 days.

### **INSURANCE**

As a courtesy, we normally insure all UPS and FEDEX shipments for value, even though our terms are FOB shipping point. Charges are prepaid and added to your invoice, please advise us if you do not want your shipment insured. If you receive a damaged shipment please follow the procedures on our "Damaged Goods Policy" which accompanies each shipment.

### **RETURN AUTHORIZATION**

When you need to return a purchase, please send a copy of the invoice or packing list and an explanation in writing to Lori Miller. You will be sent a return authorization. If you receive a defective part please call for a replacement. We will not accept parts returned without a return authorization.

### **ORDER LINES**

Our order lines are open from 8:30 a.m. to 5:00 p.m. Monday through Friday, toll free (orders only) at 1-800-638-0554. For billing/credit inquiries call Lisa Barony at (301) 449-7300. For pricing, availability, or research call (301) 449-7300. Our FAX number is (301) 449-7011 or email us at sales@detek.com

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: sales@detek.com**

**DETEK, INC**  
Temple Hills, MD 20748

**TERMS AND CONDITIONS OF SALE**

1. **Exclusion of Other Terms** DETEK, Incorporated (the "Company") sells goods exclusively on the terms and conditions stated on this Form. The terms and conditions stated herein may not be varied by Buyer, and no additional or different terms or conditions, whether stated in Buyer's purchase order form or elsewhere, shall be applicable to the transaction unless specifically agreed to in a separately signed, written instrument by an officer of the Company. All transactions for the sale of goods are subject to acceptance or rejection by the Company when received at its headquarters in Temple Hills, MD.

2. **Prices.** All prices are F.O.B. - Shipping Point, exclusive of freight, insurance and local delivery charges, if any. Shipping Point will normally be Temple Hills, MD. However, if an item is not in stock we may elect to drop ship directly from the manufacturer to the buyer. In such cases, the manufacturer's facility will be the Shipping Point.

3. **Taxes.** All applicable sales, use, excise, gross receipts and other similar taxes (excluding only taxes on the net income of the Company) are the responsibility of the Buyer, and Buyer shall promptly pay or reimburse the Company for payment of any such taxes on demand. If Buyer claims an exemption from such taxes, a written exemption certificate must be furnished to the Company for the State into which the goods are to be shipped or delivered.

4. **Payment** - Orders are invoiced at the time of shipment and payment in full is due within 30 days of the date of the Company's invoice. Amounts unpaid thirty (30) days from the date of invoice shall be considered delinquent and shall be subject to a delinquent payment charge in the amount of one and one-half percent (1 ½ %) per month (or the highest rate permitted by law) for each month, or part thereof, that the amount remains delinquent.

5. **Shipment** - The Company shall not incur any liability of any kind whatsoever for failure to ship on any particular date, unless a firm shipping date has been expressly agreed to by an officer of the Company in a written instrument. Risk of loss shall pass to Buyer when the goods are placed in the possession of a common carrier. Claims against the carrier shall be the responsibility of the Buyer, and claims against the Company for patent defects, errors, or shortages must be made in writing to the Company within fifteen (15) days of receipt of the goods, or such claims shall be deemed to have been waived.

6. **Warranty Matters** - Detek, Inc acts as a manufacturer's representative and manufacturer's authorized reseller. Resale products are goods, which are sold with Company's goods, which are not manufactured by the Company and are supplied as an accommodation to the Buyer. Company's responsibility for resale products is limited to reasonable commercial effort to arrange for procurement and shipping. Unless otherwise agreed, all prices are FOB resale product manufacturer's factory. Standard documentation such as material certification, MSDS, etc. shall be only as supplied by the resale product manufacturer. Company makes no warranty for resale products, either express or implied including warranties of merchantability and fitness for a particular purpose. The only warranties made with regard to resale products are those made by the resale product manufacturer to buyer, if any. Buyer agrees that Company has no liability for resale products beyond the services within Company's direct control necessary to reasonably discharge the above stated responsibility and that Company shall not be liable for delays caused by resale product manufacturer. Buyer further agrees that Buyers Sole and Exclusive Remedy for the Company's breach of the stated responsibility shall be limited to the difference between the resale product manufacturer's price to the Company and the Company's price to the buyer for the resale products involved in such breach. Buyer agrees that in no event shall Company's liability for resale products extend to include incidental, or consequential damages including, but not limited to, loss of anticipated profits, loss of use, loss of business, lost opportunities, loss of revenue, and the like. In no event, shall Company be liable for

property damage, and or third party claims covered by umbrella insurance and/or indemnity coverage provided to buyer, its assigns and each successor in interest to the goods provided against the above referenced order. Buyer agrees, that as such, any and all indemnity clauses contained in either buyer or Company's standard terms are null and void for resale products on all orders governed by these Terms and Conditions.

7. **Damage Limitation.** Under no circumstances, shall the Company be liable for any lost profits, or other incidental or consequential damages of any kind for any reason whatsoever with respect to its products or the transactions by which its products are sold.

8 **Cancellations** - Orders accepted by the Company may be cancelled by the Buyer prior to shipment only with the Company's consent. Cancellation may be subject to payment of a cancellation charge equal to ten percent (10%,) for orders cancelled less than thirty (30) days prior to shipment.

9 **Returned Goods.** The buyer may return goods only with the Company's consent and may be subject to payment of a twenty percent (20%) restocking charge. Goods must be in new condition and in original shipping containers.

10 **Software** - Any software or embodied within Products shall be governed by separate license agreement(s) which will be furnished to the Buyer at the time of delivery. Notwithstanding any other terms or conditions neither title to the software, not proprietary rights associated with the software, shall be transferred to the Buyer. The software comprises proprietary information and technology of the Company, and the Buyer may be required to adhere to certain nondisclosure obligations set forth in the aforementioned license agreement(s).

11. **Excuse** - In no event shall the Company be liable for any loss or damage resulting from any delay or failure in shipment or other failure to perform with respect to the sale of goods where such delay, failure, loss or damage is the proximate result of any act of any governmental authority, revolution, riot, civil disorder or disturbance, act of enemies, delay or default in transportation, strike, dispute among or between labor unions or other labor disputes, inability to obtain materials or facilities from normal sources, fire, flood, act of God, or any other cause not within the reasonable control of the Company, whether of the class of causes enumerated or otherwise. Without limiting the generality of the foregoing, the Company may, without causing a breach or incurring liability, allocate goods which are in short supply irrespective of the reasons therefor, among customers in any manner which the Company in its sole discretion deems advisable.

12. **Governing Law** - the transaction with respect to the sale of goods shall be governed by and interpreted and construed in accordance with the laws of the State of Maryland, and any action arising out of such transaction shall be brought exclusively in courts seated in Prince George's County Maryland. Buyer agreement to such exclusive jurisdiction and venue is a condition of sale.

13. **ENTIRE AGREEMENT** - This instrument constitutes the entire and only agreement between the parties hereto concerning the subject matters covered herein and any representation affirmation of fact and course of prior dealings promise or condition in connection herewith or us age of the trade not incorporated herein shall not be binding on either party. No waiver alteration or modification of any of the provisions hereof shall be binding unless in writing and signed by a specifically authorized representative of Detek, Inc.

# X-ray Products

## Product Overview





ERESCO MF3 Series

## ERESCO MF3 Portable X-ray Equipment

By using the latest technology and innovative circuitry, the weight of the ERESKO control was reduced by almost 40% compared to the MF2 series. This weight reduction combined with new carrying rings and an even more compact and robust tube design make on-site inspections an easy task in the true sense of the word.

The ergonomic digital control with its new graphical display is easy and safe to operate. The ease of use is further supported by clear text messages in many international languages, display of character sets (e.g. Cyrillic characters), an exposure calculator and many other features. High quality electronic components and robust design of control and tube heads make the ERESKO Series suitable for inspections even in hostile environments like rain (IP 65) or high temperatures (100% duty cycle at 30°C/86°F ambient temperature). Its low power consumption keeps not only the energy cost low but also makes operation with portable power supplies an easy thing to do. Due to its unique power mode the ERESKO MF3 Series can reduce exposure times up to 50% in comparison to other portables which impressively shows its position as the leading product for fast and economic on-site inspections.



ISOVOLT mobil

## ISOVOLT Mobile X-ray Equipment

The ISOVOLT mobile has been designed to cope with even very complicated inspection tasks. It is very frequently used in container, pipe production and power plants where the objects are difficult to access.

Therefore the ISOVOLT mobile features a small X-ray tube and a cable of up to 20 m length, enabling high quality on-site inspections at hard-to-reach places.

The ISOVOLT mobile key features are:

- Medium frequency technology
- Constant potential output
- Suitable for continuous operation
- Light-weight, compact design
- Dual-focus operation
- Change-over to operate different tube types
- Fit for narrow-width access doors (> 650 mm)
- Horizontal transport possible



ISOVOLT HS

## ISOVOLT Stationary X-ray Equipment

Continuous improvements of the ISOVOLT HS family plus the expertise gained in industry-specific power electronics and digital technology have resulted in a new generation of constant potential X-ray equipment, the ISOVOLT HS series. The very low ripple of the high-voltage generator results in high dose rates of the ISOVOLT HS X-ray equipment. Fast control systems lead to high stability of the operating data and high reproducibility of the inspection results. A real-time controlled automatic warm-up program provides long life-time of the X-ray tubes.

Different X-ray tubes and generators in 160 kV, 225 kV, 320 kV, 420 kV and 450 kV version cover nearly all possible applications. The ISOVOLT HS is ideally suited for dosimetric systems too.



## Standard Radioscopic Inspection Systems

The programmable **X-CUBE compact** with its integrated Image Enhancement System VISTAPLUS III offers in the standard version everything required for a fast and easy high quality inspection. The new innovative swivel principle of the X-ray manipulator allows very exact positioning while being up to 5 times faster than other systems in the market. Short inspection cycles due to very fast movements, a programming mode with variable speed, and an excellent detail recognition by integrated image enhancement are key features of this system. The modular design enables easy transportation and fast installation. The form-fitting loading position and the ergonomically optimized operation desk rounds out the concept of this excellent multi-purpose system.

Besides the X-CUBE compact GE Inspection Technologies offers three other Standard Radioscopic Inspection Systems (**DP 150**, **DP 419** and **DP 435 Vario**) to cover all applications and customer requirements from small, light-weight to big, heavy samples and from manual to programmable operation.



X-CUBE compact

## Wheel Inspection Systems

The programmable DP 500 wheel inspection systems with automated defect recognition (SABA) represent very economical systems with a high throughput at a very short idle time. The DP 500 is designed for inspection of light-alloy car wheels (13" to 20") whereas the DP 500 XL can cope with the larger diameters of truck wheels too (13" to 25").

Using a GE Inspection Technologies Wheel Identification Station the systems are capable of mixed-mode operation. The gripper principle allows unimpeded irradiation in all test positions. For shortest cycle times and reliable operation the DP 500 is equipped with a SIEMENS S7 PLC control.



DP 500

## Customized Inspection Systems

GE Inspection Technologies designs and manufactures a wide range of specialized and customized Radioscopic Inspection Systems for various applications and industries. The two samples below represent only a very small selection of this applications. More information about the product range is available on our website at [www.GEInspectionTechnologies.com](http://www.GEInspectionTechnologies.com).

The DP 351 industrial X-ray system is dedicated to **fully automated serial inspection of suspension parts** with GE Inspection Technologies ADR software SABA. The system has been developed for radioscopic inspection of large batches and is characterized, above all, by a very fast cycle time. The twin manipulator enables the loading and unloading of a specimen outside the cabinet while at the same time the inspection of other parts is done inside. Loading and unloading can take place by a robot or manually by an operator.

The DP 392 industrial X-ray system has been developed for **airbag inspection**. The measurement of both shell halves' wall thickness at the rolled seams and a good positive-fitting connection between initiator and the propulsion element of the airbag inflator are the inspection tasks of this application.

**SABA** is used for fully automated image evaluation which in this case is equipped with an additional pre warning stage for optimal production control.



DP 351



DP 392



DP 424 / DP 425

## 3D Computed Tomography

As result of the rapid development of computer, software and detector technology, 3D-Computer Tomography is gaining more and more in importance - not only in research but also in industry.

By using cost efficient modern parallel computers for reconstruction and visualization of the measurement data and by using of recent flat panel detectors for acquiring the images, 3D-CT offers unique opportunities to map the structure of about any test sample three-dimensional in the computer.

Based on volumetric data, it's possible to find many defects in the test sample without destroying the sample itself. Furthermore dimensional measurements of the structure of the test samples can be performed and even copies of the test samples can be done by rapid prototyping technologies.

The latest GE Inspection Technologies developments are now allowing volumetric tomography in very short cycle times. Already within minutes internal structures of test samples can be displayed and measured three-dimensionally. Defects in the material can be exactly located, or deviations of the object structure from CAD data can be quickly acquired in a non-destructive way.

## Image Enhancement System VISTAPLUS III

VISTAPLUS III is a PC-based digital image enhancement and archiving system that can be operated either with Windows 2000 or Windows XP.

It is superbly suited to enhance the detectability of minute structures and to perform fast evaluations and assessments of radioscopic images.

The VISTAPLUS III is set up for integration in radioscopic X-ray inspection systems and used in many of GE Inspection Technologies systems. Existing customer systems can be upgraded too.



## Automatic Image Evaluation System SABA

The universal analysis of complex radioscopic images in batch inspection of safety-relevant parts is a monotonous and strenuous task whose outcome depends on many subjective factors.

The state-of-the-art image evaluation system SABA automates this process and leads to an reproducible objective identification and evaluation of defects in cast parts. Built-in statistic programs enable the optimizations of the production process.

By its universal nature the PC-based SABA can be adapted to other inspection tasks as well, such as fully automatic completeness checks and measurements of various patterns (e.g. areas, sizes and distances).



GE  
Sensing & Inspection Technologies

# ERESCO MF4

Reliable, Lightweight, Portable X-Ray Generator



# ERESCO MF4 – For the toughest of tasks

The ERESKO MF4 portable X-ray units are designed for reliability in some of the world's toughest conditions. With the ERESKO 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 ERESKO 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 ERESKO 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 ERESKO 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**.



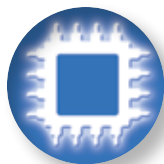
The power electronics of ERESKO units provide extremely **low power consumption** between 1 to 2 kW/h.



**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 ERESKO power mode.

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

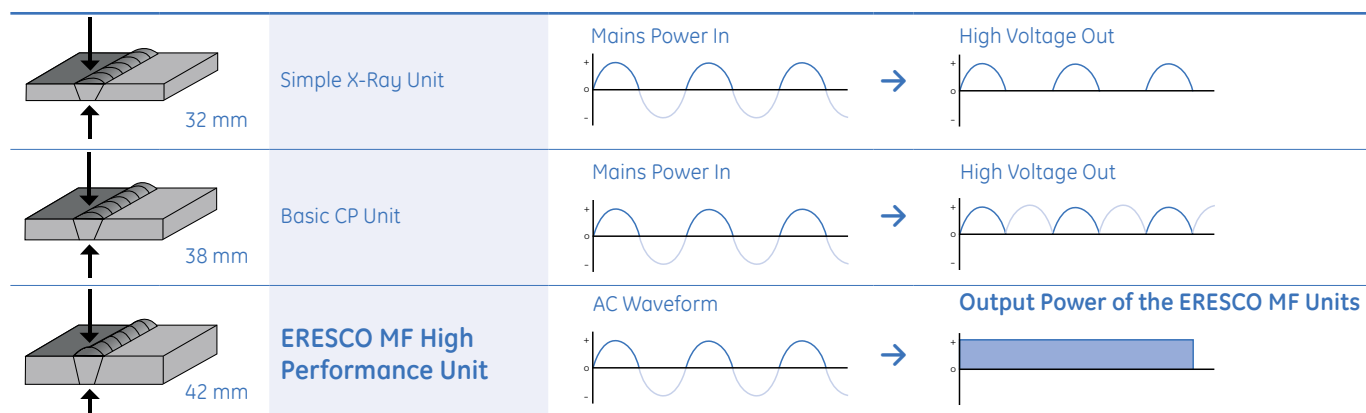


**Microprocessor platform** enables fast and safe unit control providing intelligent features, such as automatic tube head identification, autonomous operation with event recording, multi-lingual user interface and different exposure programs.



# 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 facilitates an ergonomic interaction concept for safe and efficient operation unit operation. Several on-board features, such as Exposure Calculator, Parameter Monitoring or Programming / Reporting tools are simplifying 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 archived. 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
- Transreflective, 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 ERESKO MF4 generators.



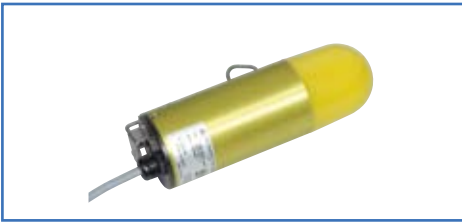
Four legged stands for tube heads to ensure stability



Laser centring device



Lead plug for the tube window



Remote warning flash lamp



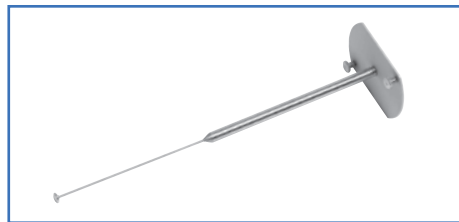
Exchangeable lead diaphragms



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 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 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) **					

# ERESCO MF4 Control

## Portable X-ray Unit Digital Control



### Features

- Robust and ergonomic design for operation in different working positions
- Transflective, backlit, graphic display for contrast optimized indoor and outdoor operation
- intuitive and menu driven user interface with multifunction-, numeric- and cursor keys input
- Multiple on-board features:
  - Exposure Calculator
  - Customizable exposure programs (supports off-line administration with PC tool including download, upload, archiving, reporting)
  - System parameter monitoring
  - Intelligent fully automatic warm-up program
  - RS-232 interface
  - Power mode for shortest possible exposure time
  - Supports 250 exposure programs
  - Supports 256 event and warm-up records each with synchronization to different radiation units
  - Supports off-line analysis of event and warm-up records (for reporting and documentation purpose)
  - Automatic recognition of connected X-ray tube head
- Small size, low weight and water / dust resistant (IP 65)
- Protective front panel cover
- Modern power electronics
- Microprocessor-controlled
- Built-in fail-safe warning lamp
- Easily adapts to different mains supplies, including portable generators
- Emergency-Stop in compliance with international standards

### Certifications

- CE compliant acc. to EMC and Low Voltage Directive
- French Standard NFC 74100
- BfS certification (PTB approval) \*
- Produced under ISO 9001 certified quality management system

\* in conjunction with radiation unit



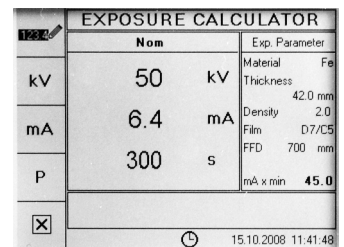
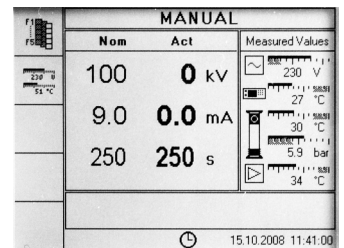
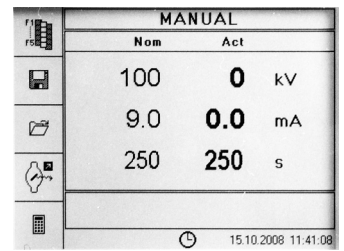
GE imagination at work



# Technical Data

Voltage, settable in steps of 1 kV	5 - 300 kV (depending on the tube head)
Current, settable in steps of 0.1 mA	0.5 - 10 mA (depending on the tube head)
Exposure time in 1 sec steps or as min/sec value	1 to 5994 sec (optional display 99 min / 99 sec)
Pre programmable exposure programs	max. 250
Memory Size for event and warm-up records	256 for each
Display	transflective, backlit, graphic-display, 320 x 240 pixel
Supported languages	19
Character Sets	4, European (ISO), Japanese, Chinese, Cyrillic
Exposure Calculator	on-board, Fe, Ti, Al pre programmed / 3 materials free programmable
Warm-up	fully automatic, based on real time clock
Tube head identification	automatic
Parameter monitoring	continuous, on-line display of temperatures, pressure and line-voltage
Serial interface RS 232	1
Safety interlocks	2 (primary also available)
Emergency-Stop button	1
Three-position key switch	OFF, STANDBY, ON
Power supply requirements *)	1 PE N, 160 V - 253 V AC, max. 13 A single phase with grounded neutral, 1 PE N, 80 V - 127 V AC, max. 20 A, 50/60 Hz
Dimensions	see drawing
Weight	8.6 kg (19 lbs)
Protection class	IP65
Operating Temperature	-20°C to +70°C
Storage Temperature	-30°C to +80°C

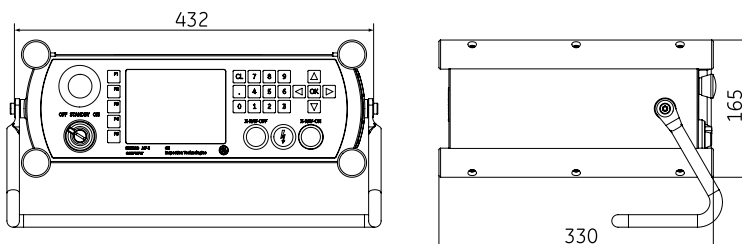
\*) Operation with reduced output is possible at mains voltages below 205 V and 108 V respectively.



Exemplary screenshots of user Interface

## Standard Delivery Scope of complete X-ray unit

- ERESKO MF4 tube head (see sep. product information)
- Digital Control "ERESKO MF4 Control"
- Canvas bag
- Connecting cable for ERESKO MF4, various length up to 60 m (193 ft)
- Power connecting cable 230 V or 115 V, 10 m (32 ft) long
- Set of accessories containing: spare fuses, spare bulbs and Allen key



## Options

- External fail-safe flashing warning lamp
- Aluminium transport box
- MF4 Administrator Kit (CD-ROM and Interface Cable)
- Connecting cable for door contacts
- Extension cable ERESKO MF4, 20 m / 10 m (64 ft / 32 ft)
- Portable electric power generator for ERESKO MF
- Exposure calculator (PC based)
- Primary interlock kit
- Adapter cable for ERESKO MF3 radiation unit, 20 m / 0.5 m (64 ft / 1.6 ft) long



[www.gesensinginspection.com](http://www.gesensinginspection.com)

GEIT-30172EN (11/08)

© 2008 General Electric Company. All Rights Reserved. Specifications are subject to change without notice. GE is a registered trademark of General Electric Company. Other company or product names mentioned in this document may be trademarks or registered trademarks of their respective companies, which are not affiliated with GE.

Contact: GE Sensing & Inspection Technologies GmbH, Bogenstrasse 41, 22926 Ahrensburg, Germany, T +49 (0)4102 807 0

# ISOVOLT mobil

## Industrial X-ray Equipment

The ISOVOLT mobil is designed for operations where access to the inspection point is difficult.

It is ideal for site use in the energy, mineral and petro-chemical industries where pipelines and container tanks require X-ray inspection.

The ISOVOLT mobil is equipped with a small X-ray tube and high voltage cable up to 20 m (64 ft) in length to allow positioning in hard to reach places not accessible by other types of X-ray equipment.



## Standard Delivery Scope

1 High voltage generator 160 kV	2510940
1 ISOVOLT mobil control unit	2522860
1 WL 2001 water cooling pump	2540390
1 ISOVOLT 160 M2 X-ray tubehousing	2530360
1 High voltage cable, length 10 m (32 ft)	2512465
1 PVC protective hose for high voltage cable and water hoses	9340110
1 Cart	2551340
1 Set cooling water hoses and accessories	7261020

## Options

- Pipe inspection stand for tubehousing
- Extra-length high voltage cable (15 m (48 ft), 20 m (64 ft))
- Diaphragm and centering device
- External fail-safe warning flash lamp
- External fail-safe warning blinker lamp

## Technical Equipment Data (not considering tube limit values)

Connected load:	230 V $\pm$ 10%; 50/60 Hz; 3.0 kVA; max. 16 A
Tube voltage:	5 - 160 kV, (in 1 kV steps)
Tube current:	0.5 - 10 mA, (in 0.1 mA steps)
Exposure time to be set:	0.1 to 99.9 min in 0.1 or 1 second increments (optional display in min or sec)
Cooling output of WL 2001*:	1600 W at an ambient temperature of 25°C

\*) For further details see product information WL2001.

## Dimensions

High voltage generator:	870 x 300 mm (34.3" x 11.8") (without clamp lever) 1020 x 300 mm (40.2" x 11.8") (with clamp lever)
WL 2001 water cooling pump:	320 x 305 x 510 mm (12.6" x 12.0" x 20.1") (WxDxH)
Control unit:	390 x 319 x 169 mm 15.4" x 12.6" x 6.7") (WxDxH)
Cart:	Maximum width approximately 620 mm (24.4")
High voltage cable:	10 m (option: 15 m (48 ft) / 20 m (64 ft))
Mains cable:	10 m (32 ft)

## Total weight

With high voltage cable, 10 m:	approx. 151 kg (333 lbs)
With high voltage cable, 15 m:	approx. 158 kg (348 lbs)
With high voltage cable, 20 m:	approx. 165 kg (363 lbs)

## Available X-ray Tubehousings:

### X-ray Tubehousing ISOVOLT 160 M2 0.4 / 1.5

Direct radiating unit

Maximum tube voltage	160 kV	
Maximum anode dissipation:	<u>Small Focus</u> 640 W	<u>Large Focus</u> 1600 W
Tube current (at $U_{max}$ ):	4 mA	10 mA
Focal spot size (EN 12 543):	1.00 mm ( $\approx$ 0.4 IEC 336)	3.0 mm ( $\approx$ 1.5 IEC 336)
Emergent beam angle:	40°	
Inherent filtration:	1 mm Be	
Weight:	approx.. 8.5 kg (19 lbs)	

For further details see separate Product Information.



### X-ray Tubehousing ISOVOLT 160 MC 2

Panoramic radiating unit

Maximum tube voltage	160 kV
Maximum anode dissipation:	1000 W
Tube current (at $U_{max}$ ):	6 mA
Focal spot size (EN 12 543):	0.4 x 4.0 mm (at radiated angle of 0°)
Former focal spot designation:	0.3 x 3.0
Emergent beam angle:	40° x 360°, symmetrical
Inherent filtration:	0.5 mm Ti + 2 mm Al + 2 mm H <sub>2</sub> O
Weight:	approx. 8 kg (17.7 lbs) (with optional cable quick-lock)

For further details see separate Product Information.



At present, the control unit comes in two versions with eight languages each.

Version A: Western Europe German, English, French, Spanish, Portuguese, Italian, Norwegian, Swedish

Version B: Eastern Europe German, English, Slovenian, Russian, Polish, Roumanian, Czech, Hungarian

## High Voltage Generator

The high voltage generator is oil-insulated. It features power and monitoring electronics, a filament transformer, electro-magnetic focus change-over and a key switch to select the tube that is connected at the time.

## High Voltage Cable

The high voltage cable, the cooling water hoses and the ground wire form a bundle that is sheathed in a plastic jacket for handling and protection.

## Transport Cart

The ergonomic transport cart is light-weight and moves on air tires. An eyebolt allows easy lifting by a crane. The compact design enables access even through narrow doors. Horizontal transportation in a station wagon with adequate clearance is permissible.

## Characteristics

- Low weight
- Simple compact design
- Access through narrow doors (> 650 mm)
- Short exposure times
- Dual-focus mode
- Change-over to operate different tube types
- Horizontal transportation possible
- Modern power electronics
- Microprocessor-controlled
- SMD technology
- Designed for continuous operation
- Fully automatic warm-up program with real-time clock
- Storage of 250 pre programmed exposure programs in a non-volatile memory
- Four-line LCD display with back light for clear text messages
- EMC-certified in compliance with EN 55011 / IEC 801 (electromagnetic compatibility)
- Produced under ISO 9001 certified quality management system







**XR 150**  
X - R A Y   S O U R C E





# **XR150** X - RAY SOURCE

## FEATURES AND SPECIFICATIONS

**Size:** 4.12" (104mm) high x 3.12" (80mm) wide x 10.75" (273mm) long

**Weight:** 4 lb. 6 oz. (2.0 kg.)

**Power Supply:** 7.2 volt removable, rechargeable, nickel cadmium battery pack. 2500 pulses per battery charge.

**Battery Recharge**

**Time:** 1 hour with supplied battery charger.

**Output Dose:** 1.0 milliroentgens per pulse at 1 foot from source.

**Pulse Rate:** 10 pulses per second nominal.

**Source Size:** 2.2 mm.

**Pulse Length:** 60 nanoseconds.

**Exposure Control:** Electronic counter can be set for 3-297 pulses.

**Time Delay:** User has the option of 15 or 60 second time delay, allowing the user time to leave the area before the X-ray unit fires.

Specifications subject to change at manufacturers discretion.



## CONVENIENT

The XR150 X-ray source is a complete, single package, pulsed device for use in exposing conventional or instant type X-ray film. Weighing under five pounds, the XR150 makes an ideal X-ray source for various portable applications. The entire system fits into one carrying case and weighs just 30 pounds.

## EASY TO OPERATE

This compact X-ray unit is very simple to use. Operation requires attaching the battery, setting the desired number of pulses, and firing the X-ray using either the remote cable or the time delay button.

## HIGH OUTPUT

Despite its small size the XR150 has 150 KVP output which will penetrate 1/2 inch steel. The only power supply is a custom battery pack that fully recharges in one hour.

## DEPENDABILITY

Golden Engineering has been manufacturing portable X-ray systems since 1973. Golden Engineering produces THE INSPECTOR® X-ray source Model 200 which is in use worldwide for security and industrial applications.



## DETEK, Inc.

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

800-638-0554    FAX 301-449-7011  
www.detek.com    sales@detek.com

# XR200 X-Ray Source



- Battery Powered
- Lightweight - 12 Pounds
- Entire System Fits into One Carrying Case (Including Instant Print Film System)
- Penetrates up to 1/2" of Steel
- Compatible With Film-Based and Digital Imaging Systems



DETEK, Inc.  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com

# XR200

## X-Ray Source

The XR200 is a 150kV, single-package, pulsed X-ray source used by military, law enforcement, corporate security, and industrial personnel for radiographic examination of various items. The option of use with conventional radiographic film, instant radiographic film, or digital inspection systems provides users with the flexibility to develop a complete radiographic system best suited to their individual needs. The combination of battery power and minimal weight allows the user to obtain radiographs in even the most remote location.

To operate, attach a charged battery, set the number of pulses, and fire the unit. The user can view a high quality X-ray image immediately when using a video inspection system or within two minutes when using the Polaroid instant radiographic film system.



### SPECIFICATIONS

Size (Including battery pack) .....	12.5 in. (31.75 cm) x 4.5 in. (11.5 cm) x 7.5 in. (19 cm)
Weight (Including battery pack) .....	12 lbs. ( 5.5 Kg )
Output dose .....	3.3 mR/pulse +/- 0.5 mR measured 12 inches from source
Pulse rate .....	25 pulse per second nominal
X-ray source size .....	1/8 in. (3 mm)
Maximum photon energy .....	150 KVP
X-ray pulse width .....	60 nanoseconds
Current draw .....	35 amps @ 13.4 volts
Power supply .....	DeWalt® 14.4 volt, removable, rechargeable, nickel-cadmium battery
Battery recharge time .....	1 hour with standard DeWalt® charger, 15 minute charger available
Number of pulses per battery charge .....	4000
Temperature range .....	-10 to 120 degrees F (-23 to 50 degrees C)
Maximum duty cycle .....	200 pulses every 4 minutes (3000 pulses per hr)
Warm-up .....	None required
X-ray leakage .....	3 mR per 100 pulses measured 2 inches behind the unit
Warranty .....	1 year limited warranty



# XRS-3 X-Ray Source



- New Electronics Package Including Sealed Membrane Switch
- User Selectable Default Pulse Setting
- Backlit LCD
- Penetrates up to 1" of Steel
- Optional Thumbwheel Key
- Fully Battery Powered



DETEK, Inc.  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com

Military - Law Enforcement - Industrial



# XRS-3

## X-Ray Source

The XRS-3 is a light duty X-ray machine that requires little maintenance. The modular design makes component replacement easy and cost effective. The DeWalt® 14.4V battery and battery charger are commercially available in retail stores worldwide.

Lead shielding in the XRS-3 protects the user by minimizing radiation leakage outside of the X-ray beam while a time delay button and remote cable allow the operator to move a safe distance from the unit when it is in operation. Visual and audible indicators in the unit alert the operator when the XRS-3 is activated. Also, the XRS-3 contains no radioactive material. The unit produces radiation only when it is pulsing.



### Specifications

Size (Including battery pack)	14" (35.6 cm) x 4.5" (11.5 cm) x 7.5" (19.0 cm)
Weight (Including battery pack)	12lbs (5.4kg)
Output dose	4.0 mR/pulse max, 2.6 mR/pulse min, measured 12 inches from source
Pulse rate	15 pulse per second nominal
X-ray source size	1/8 in. (3 mm)
Maximum photon energy	270 KVP
X-ray pulse width	50 nanoseconds
Current draw	20 amps @ 13.4 volts
Power supply	DeWalt® 14.4 volt, removable, rechargeable, nickel-cadmium battery
Battery recharge time	1 hour with standard DeWalt® charger, 15 minute charger available
Number of pulses per battery charge	4000
Temperature range	-10 to 120 degrees F (-23 to 50 degrees C)
Maximum duty cycle	200 pulses every 4 minutes (3000 pulses per hr)
Warm-up	None required
X-ray leakage	3 mR per 100 pulses measured 2 inches behind the unit
Warranty	1 year limited warranty

GE  
Inspection Technologies

# The ISOVOLT *Titan E* X-ray Generator



GE imagination at work

# Robust, Reliable and Highly Accurate Stationary X-ray Generators for the Widest Range of Applications.

The Reference Class for X-ray generators is based on the proven ISOVOLT platform, which offers more than 25 years experience with thousands of installations across the world.

Designed for radiography, radioscopy, radiometry and life-science applications, which place the highest demands on reliability and exposure quality, the range of *Titan E* generators and accessories meets the different degrees of automation and customization, required throughout the industrial and scientific sectors.

A wide range of systems is provided. Generators and tubes can be 160 kV, 225 kV, 320 kV, 420 kV or 450 kV, and can be operated from as low as 5 kV or a current range exceeding up to 45 mA\*.

*Titan E* control is a modern, state-of-the-art industrial control module for fail-safe and intuitive system operation.

A powerful range of suitable accessories complements the integration and application capabilities for all facets of industrial or scientific environments.

## Unique Features at a Glance



### Highest exposure quality

A reproducibility of  $\pm 0.01\%$  for tube current (mA) and tube voltage (kV) provides highest possible stability of radiation dose rate with fluctuations  $< 0.05\%$ .

This excellent dose reproducibility fits both, *Titan E* applications that demand the highest accuracy, such as calibration of detectors or dosimeters, as well as radiography applications.

Extremely low ripple ensures outstandingly stable High Voltage for optimized material penetration with excellent efficiency factors.

The extended tube range of 5 kV to 450 kV in conjunction with the excellent maximum current of 45 mA, ensures optimized imaging contrast and very high penetration power. This results in short exposure times in various operation modes for different material.



### Highest device performance

Rugged generator design with intelligent tube integration and permanent system monitoring, ensure highest performance, from peaked intermittent, up to permanent 24/7 operation. This results in consistent performance over various exposure modes and operation conditions.

Unmatched ramp-up times ( $< 1.5$  sec) support applications requiring fast inspection cycles\*.

100% duty cycle, for continuous operation in in-line systems.

Optimized equipment performance results in increased productivity and reduced total cost of ownership.



### Highest device availability

Continuous improvements on critical system parameters to increase robustness and resistance against external influences, guarantee high system up-times that give the operator steady revenue streams and perfect time utilization.

Stackable and modular design allows easy field service.

Automatic event recording provide instant information for process control and system diagnosis either on site or via optional remote access.

Selected tubes feature maintenance-free High voltage connections, ensuring highest productivity, while minimizing operational risks.

Fully automated tube warm-up procedures safeguard tube operation and ensure maximum tube life.



### Flexible usage

Built for a wide range of applications in different environmental conditions, *Titan E* generator solutions are for all NDT needs, life science applications and also measurement and calibration tasks.

*Titan E* is available in 3-phase, 400 V or single-phase, 230 V input power rating. As a result easy integration into different power environments without regional limitations is possible.

\*) depending on permissible tube data



#### **Smart user interaction**

The stand-alone control module is available in both, a rugged and ergonomic desktop housing, and also as 19" adapter version, for easy control-desk integration.

The design permits intuitive and fatigue-proof operation through a large graphical display, rotary knob control, function keys and a keypad for fast and direct inputs.

The control interacts with the operator in clear text with four international character sets and 16 languages.



#### **Easy to integrate**

The Titan E considers typical OEM needs, providing kits, interfaces and protocols for all kinds of industrial system integration (RS 232, Profibus).

It allows full external control of X-ray equipment and simplifies remote visualization – even without connecting the control module.

Extension of diagnosis capabilities by remote access via Internet or dial-up line is available as an option.



#### **Intelligent and safe operation**

Automatic tube configuration in conjunction with real time clock powered automated warm-up procedures enhance operational safety and maximize equipment lifetime.

On board electronics feature reserved memory for up to 250 programmable operation modes, records of the last 128 warm-up cycles and 512 operation event-logs and a structured setup menu for individual performance settings.

Built in safety features such as redundant interlock monitoring, cooling flow rate watchdog signals, operating temperature and other system status information are visible on the operation display.

This leads to instant recognition of system status and health.



## Titan E Control

A user-friendly, multi-language control features a clear full-graphical display, that allows simultaneous readings of set and actual operating parameters. Embedded in an ergonomic and rugged desktop or optional 19" rack mounting housing, full control for X-ray operation is established. Intuitive guidance through diverse menus as well as unmistakable messages for clear interventions are provided with this module.

The operating concept provides interaction with turning speed sensitive rotary knob, function keys, a numeric keypad and safety relevant buttons for X-ray operation as well as a key switch.

The multifunctional rotary knob can be used to set kV, mA, exposure time and several configuration settings.

By a progressive change of voltage and current via rotary knob the kV and mA settings can be accurately changed with different granulations of 0.1kV / 1 kV / 10 kV respectively 0.01 mA (if enabled) / 0.1 mA / 1 mA. This allows optimized one-hand operation for radioscopes and many other applications.

Features such as free configurable exposure programmes, or special programmes for constant power, constant current and manual operation cater for individual demands for radiographic or radioscopic inspections. The multi-lingual user display with 16 different languages and extended character sets for Japanese, Cyrillic and Chinese enables comprehensible and simple interaction. Optional, the entire system control with graphical visualization can be done via a stand-alone PC based platform.

*Titan E* provides automatic and manual warm-up modes for optimized tube conditioning. A special extended warm-up mode safeguards tube performance under severe conditions and setups.





## Benefits

### Proven platform serving broad range of applications

- Tube protection due to automatic warm-up procedures and extended warm-up modes to safeguard tube performance.
- Smart and intuitive user interaction, with several integration possibilities facilitating higher productivity.
- Excellent dose reproducibility with extremely stable high voltage section for optimized exposures.
- Convenient integration into several external platforms, such as automated testing machines, leveraging different interface features for device control, monitoring and visualization.
- Excellent endurance and performance for permanent or intermittent operation.
- Less intensive maintenance combined with easier serviceability reduces total cost of ownership.
- Broad range of tubes, accessories and kits available.





## Accessories

### Safety devices

- Primary interlock switch
- Alarm box
- Switch box
- Flash- and warning lamps
- Country specific safety kits

### HV cables

- In different standard lengths, with quick-lock or flange connections with rubbercone plugs or maintenance-free angle plugs.

### Integration and solution kits

- Exposure Calculator (PC Software)
- *Titan E* PC (External PC based visualization)
- PROFIBUS Extension Kit

### Dosimetry and calibration kits

- Voltage divider (incl. PTB certification)

### Pumps and coolers

(See pictures below)



WL 3000 SE



OW 4002



OL 4503



OLK 50



Voltage Divider

# ISOVOLT

## Selection of unipolar Tubes\*

	ISOVOLT 160 M2 0.4-1.5	ISOVOLT 160 M2 0.4-3.0	ISOVOLT 160 M2 0.4-0.4HP	ISOVOLT 160 MM2/ HP	ISOVOLT 160 MC2	ISOVOLT 160 M1	ISOVOLT 225 M2 0.4-3.0	ISOVOLT 225 M2 0.4-1.5	ISOVOLT 225 MM2/ HP
Max. Tube Voltage (kV)	160	160	160	160	160	160	225	225	225
Tube Current (mA) (at Max. Tube Voltage)	10 4	19 4	6 6	11 5	6	15,6 5,6	13 3,0	7,0 3,0	8 3,5
Max. Anode Dissipation (W)	1600 640	3000 640	1000 1000	1800 800	1000	2500 900	3000 640	1600 640	1800 800
Nom. Focal Spot Value IEC 336	1.5 0,4	3,0 0,4	0,4 0,4		0,3 x 3		3,0 0,4	1,5 0,4	
Focal Spot Size EN 12 543 (mm)	3,00 1,00	5,50 1,00	1,00 1,00	1,00 0,40	0,40 x 4,00	3,00 1,00	5,50 1,00	3,00 1,00	1,00 0,40
Inherent Filtration (mm)	1.0 / Be	1.0 / Be	1.0 / Be	1.0 / Be	0.5 Ti + 2.0 H <sub>2</sub> O + 2.0 Al	1.0 / Be	1.0 / Be	1.0 / Be	1.0 / Be
Emergent Beam Angle	40°	40°	40°	30° x 40° Asym.	40° x 360° Sym.	40°	40°	40°	30° x 40° Asym.
Weight (kg (lbs))	8.5 (18.7)	8.5 (18.7)	8.5 (18.7)	8.5 (18.7)	8.0 (17.6)	8.5 (18.7)	11.9 (26.2)	11.9 (26.2)	11.9 (26.2)

## Selection of bipolar Tubes\*

	ISOVOLT 320/7	ISOVOLT 320 M2 4.5 - 13	ISOVOLT 320/13	ISOVOLT 320 M2 0.4 - 1.0 HP	ISOVOLT 420/5	ISOVOLT 450/5	ISOVOLT 450/10	ISOVOLT 450 M2/10	ISOVOLT 450 M2 0.4 - 1.0 HP
Max. Tube Voltage (kV)	320	320	320	320	420	450	450	450	450
Tube Current (mA) (at Max. Tube Voltage)	7 3	13 4.5	13 5	5.6 2.5	5.3 2.3	5 2.1	10 3.7	10 2	3.3 1.5
Max. Anode Dissipation (W)	2240 960	4200 1500	4200 1680	1800 800	2240 960	2240 960	4500 1680	4500 900	1500 700
Nom. Focal Spot Value IEC 336	1.8 0.8	4.0 1.5	3.5 1.5		1.5 0.8	1.5 0.8	3.5 1.5	3.0 1.2	
Focal Spot Size EN 12 543 (mm)	3,60 1,90	5,50 3,00	6,30 3,00	1,00 0,40	3,60 1,90	3,6 1,90	6,30 3,00	5,50 2,50	1,00 0,40
Inherent Filtration (mm)	7.0 / Be	3.0 / Be	7.0 / Be	3.0 / Be	7.0 / Be	7.0 / Be	7.0 / Be	5.0 / Be	5.0 / Be
Emergent Beam Angle	20° x 40°	40°	40°	30° x 40° Asym.	20° x 40°	20° x 40°	40°	40°	30° x 40° Asym.
Weight (kg (lbs))	35 (77)	35 (77)	35 (77)	36 (77)	75 (165)	75 (165)	75 (165)	75 (165)	75 (165)

\* The ISOVOLT Titan E series can be equipped with various types of tube housing to suit your application. Ask your GE Inspection Technologies representative for an application specific consultation and a full list of tube housings



Maintenance free  
angle plug



Junction Kits and  
Safety Devices



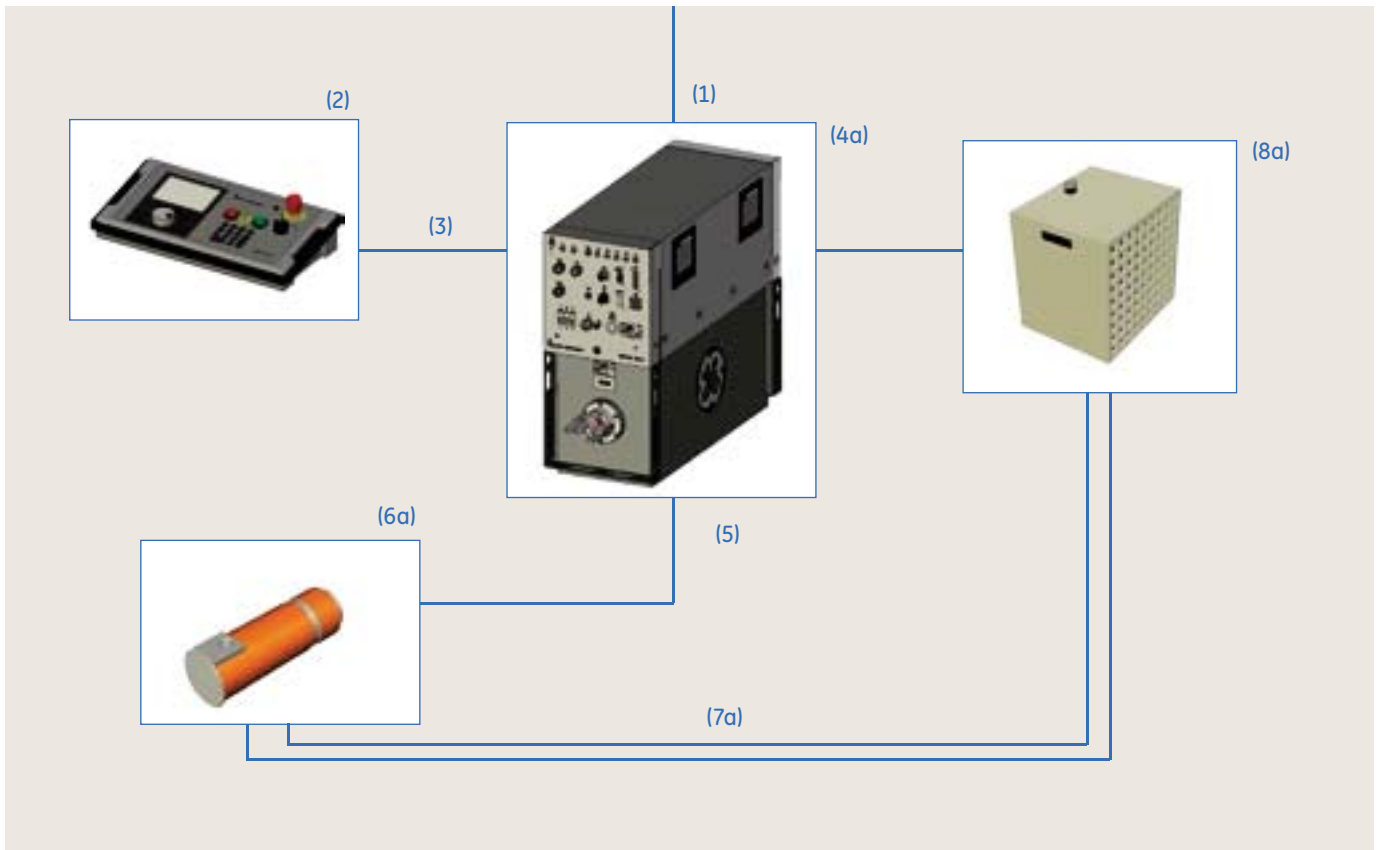
Diaphragms



Column Stand

# System Layout for Exemplary Setups

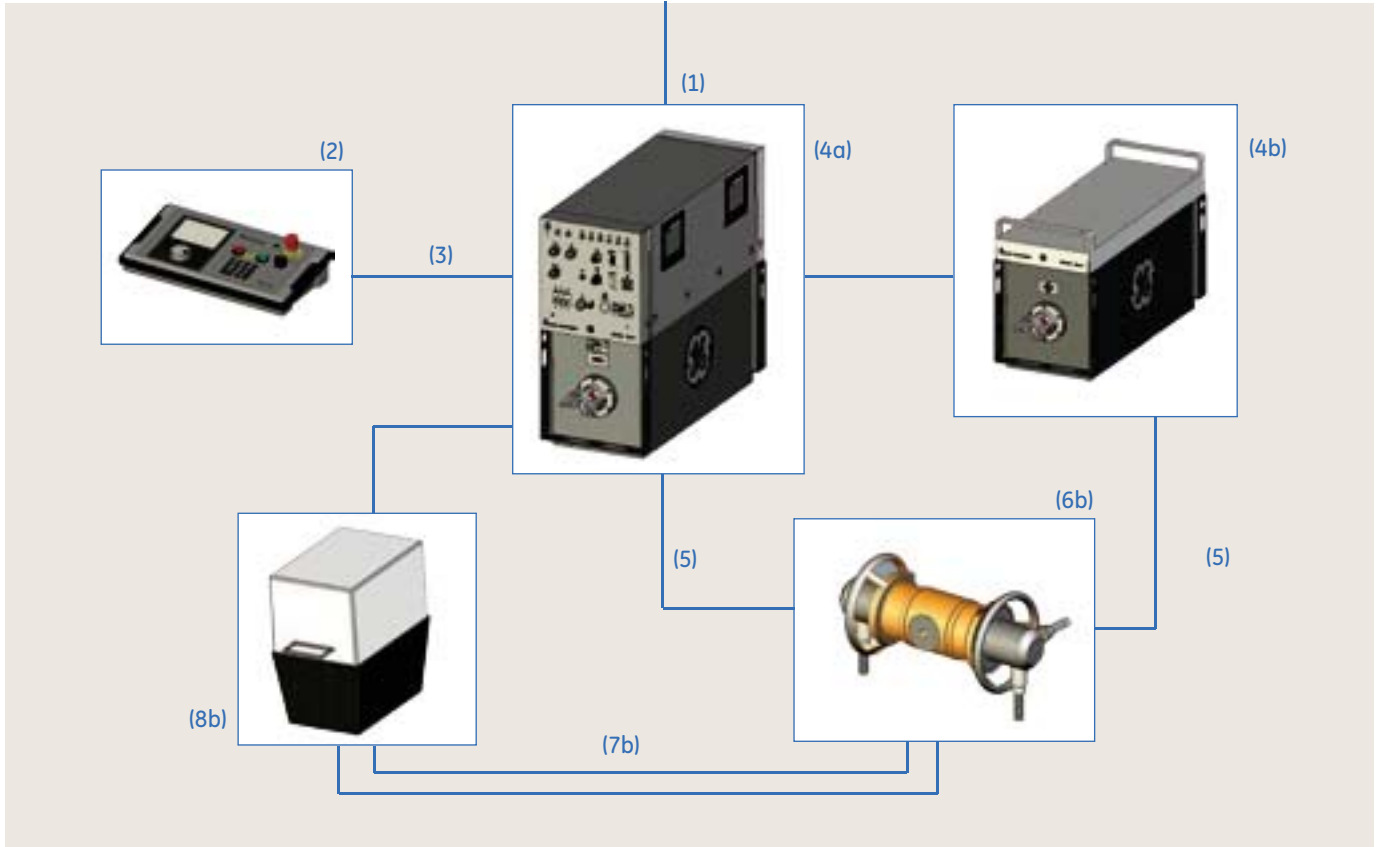
## Unipolar operation



### Legend

- |   |   |
|---|---|
| (1) Mains connecting cable, standard length 10 m / 32 ft, with wire end ferrules  | (6a) Unipolar Tube Housing<br>(see tube overview or separate product information)   |
| (2) Control Module ISOVOLT <i>Titan E</i> in desktop housing (optional 19" rack house)  | (6b) Bipolar Tube Housing<br>(see tube overview or separate product information)    |
| (3) Connecting cable control/power stage, standard length 10 m (max. 100 m) / 32 ft. (max. approx 320 ft.)  | (7a) Water hoses, standard length 10 m (max. 20 m) / 16 ft (max. 32 ft)             |
| (4a) High Voltage Generator, 160 kV or 225 kV, Cathode, with integrated power module <i>TITAN E</i>   | (7b) Cooling Oil hoses, standard length 6m (max. 20 m) / 19 ft (max. 64 ft)         |
| (4b) High Voltage Generator, 160 kV or 225 kV, Anode incl. Connecting cable   | (8a) Water Cooling Pump with built in flow rate monitor, see separate specification |
| (5) High Voltage Cables, 160 kV or 225 kV, standard length 5 m / 16 ft (max. 20 m / 64 ft for 160 kV - 320 kV; max. 10 m / 32 ft for 420 kV and 450 kV) | (8b) Oil Cooling Pump, see separate specification                                   |

## Bipolar Operation



### Input and output connections

- RS 232 interface for connection of machine controls
- Interlock as per DIN 54113.
- Interlock as per United States Radiation Control Act of 1968, § 1020.40.
- Additional warning output that is active during pre-warning time.
- External START/STOP.
- External EMERGENCY-STOP.
- Cooling system.
- External warning flash lamp (fail-safe).

- "Mains ON" (230V / 2A<sup>2</sup>).
- "High Voltage ON" (230V / 2A<sup>2</sup>).
- Potential-free contact, for "Mains ON" (60V AC / 75V DC / 2A<sup>1</sup>).
- Potential-free contact, for "Pre-warning Time ON" (30V AC/36V DC / 0.5A<sup>1</sup>).
- Potential-free contact, for "High Voltage ON" (60V AC / 75V DC / 2A<sup>1</sup>).

<sup>1</sup>) This voltage corresponds to the max. operating voltage (rating as per VDE 0110 Group B).

<sup>2</sup>) These 230 V contacts are collectively fused with 2.5 A.



## Technical Specifications

Unipolar Systems		
<b>High Voltage Generator</b>		
Max. Output Voltage	160 kV	225 kV
Max. Output Current	45 mA	45 mA
Max. Output Power	4,5 kW, Limited by Tube Specification	4,5 kW, Limited by Tube Specification
High Voltage Ripple	5 V/mA (With High Voltage Cable 10 m), 40 kHz	5 V/mA (With High Voltage Cable 10 m), 40 kHz
Insulation	Oil	Oil
Housing Dimensions (Cathode) (W x D x H)	350 x 870 x 850 mm (13.8" x 34.3" x 33.5")	350 x 870 x 850 mm (13.8" x 34.3" x 33.5")
Weight (Cathode)	189 kg (417 lbs), Including Power Module	189 kg (417 lbs), Including Power Module
<b>Tube Voltage</b>		
Preselection and Setting	From 5 to 160 kV in 0.1 kV / 1 kV / 10 kV	From 5 to 225 kV in 0.1 kV / 1 kV / 10 kV
Digital Display of Set and Actual Values	Simultaneous 4 Digits Each	Simultaneous 4 Digits Each
Display Resolution	0.1 kV	0.1 kV
Accuracy	< ±1%	< ±1%
Reproducibility	±0.01% at Constant Temperature Level	±0.01% at Constant Temperature Level
Temperature Drift	< 65 ppm/°C	< 65 ppm/°C
<b>Tube Current</b>		
Preselection and Setting	From 0.1 to 45 mA in 0.01 mA / 0.1 mA / 1 mA	From 0.1 to 45 mA in in 0.01 mA / 0.1 mA / 1 mA
Digital Display of Set and Actual Values	Simultaneous 4 Digits Each	Simultaneous 4 Digits Each
Display Resolution	0.1 mA / 0.01 mA	0.1 mA / 0.01 mA
Accuracy	± 1%	±1%
Reproducibility	± 0.01% at Constant Temperature Level	± 0.01% at Constant Temperature Level
Temperature Drift	< 65 ppm/°C	< 65 ppm/°C
<b>Exposure Time</b>		
Programmable Timer	Non-Volatile Memory	Non-Volatile Memory
Preselection and Setting	From 0.1 to 99.9 Minutes in 0.1 Min. Increments or from 1 to 999 Sec. in 1 Sec. Increments or as direct Min./Sec. value (up to 99'59")	From 0.1 to 99.9 Minutes in 0.1 Min. Increments or from 1 to 999 Sec. in 1 Sec. Increments or as direct Min./Sec. value (up to 99'59")
Digital Display of Set and Actual Values	The Remaining Time Is Displayed, i.e. After a Mains Failure Exposure Can Be Continued Without any Time Error	The Remaining Time Is Displayed, i.e. After a Mains Failure Exposure Can Be Continued Without any Time Error
<b>Prewarning Time</b>		
Preselection and Setting	Digital Setting From 2 to 250 Seconds or de-activated	Digital Setting From 2 to 250 Seconds or de-activated
<b>Programmed Mode</b>		
Number of Storable Programs	250	250
Warm-Up	Automatic Intelligent Tube conditioning based on Real-time Clock Extended warm-up for special conditioning	Automatic Intelligent Tube conditioning based on Real-time Clock Extended warm-up for special conditioning
X-ray Tube Setup	8 Tube selectable from a database of > 40 pre-programmed tubes	8 Tube selectable from a database of > 40 pre-programmed tubes
Operation History	512 Events (256 On/Off Events)	512 Events (256 On/Off Events)
Warm-up History	128 Events	128 Events
<b>Control Module</b>		
Dimensions (W x D x H)	460 x 270 x 100 mm (18.1" x 10.6" x 3.9") Built into Desk Housing	460 x 270 x 100 mm (18.1" x 10.6" x 3.9") Built into Desk Housing
Weight	4.9 kg (10.8 lbs) Including Desk Housing	4.9 kg (10.8 lbs) Including Desk Housing
<b>Connected Loads</b>		
Power connection	1N PE 230 V ± 10% 50/60 Hz 3N PE 400/230 V ±10%, 50/60 Hz, 3-Phase, Grounded Neutral TN-S or TN-C-S Mains (Star Connected System, Optional 3-Phase Isolation Transformer)	1N PE 230 V ± 10% 50/60 Hz 3N PE 400/230 V ±10%, 50/60 Hz, 3-Phase, Grounded Neutral TN-S or TN-C-S Mains (Star Connected System, Optional 3-Phase Isolation Transformer)
Grounding	Separate Grounding for X-ray Tube and High Voltage Generator (Minimum 6 mm <sup>2</sup> )	Separate Grounding for X-ray Tube and High Voltage Generator (Minimum 6 mm <sup>2</sup> )
Mains Fuses	63 A (1N PE) or 16 A (3N PE) Time-Delay Fuses, Customer-Supplied	63 A (1N PE) or 16 A (3N PE) Time-Delay Fuses, Customer-Supplied
Operating Temperature Range	0°C to +40°C	0°C to +40°C
Storage Temperature Range	-30°C to +70°C	-30°C to +70°C

<b>Bipolar Systems</b>		
<b>High Voltage Generator</b>		
Max. Output Voltage	-160 kV (Cathode), +160 kV (Anode)	-225 kV (Cathode), +225 kV (Anode)
Max. Output Current	45 mA	45 mA
Max. Output Power	4,5 kW (Cathode) 3 kW (Anode) Limited by Tube Specification	4,5 kW (Cathode) 3 kW (Anode) Limited by Tube Specification
High Voltage Ripple	10 V/mA (With High Voltage Cable 10 m), 40 kHz	10 V/mA (With High Voltage Cable 10 m), 40 kHz
Insulation	Oil	Oil
Operation History	512 Events (256 On / Off events)	512 Events (256 On / Off events)
Warm-up History	128 Events	128 Events
Housing Dimensions (Cathode) (W x D x H)	350 x 870 x 620 mm (13.8" x 34.3" x 24.4")	350 x 870 x 620 mm (13.8" x 34.3" x 24.4")
	350 x 870 x 850 mm (13.8" x 34.3" x 33.5")	350 x 870 x 850 mm (13.8" x 34.3" x 33.5")
Weight (Anode)	123 kg (272 lbs)	123 kg (272 lbs)
Weight (Cathode)	189 kg (417 lbs), Including Power Module	189 kg (417 lbs), Including Power Module
<b>Tube Voltage (Anode)</b>		
Preselection and Setting	From 5 to 320 kV in 0.1 kV / 1 kV / 10 kV	From 5 to 450 kV in 0.1 kV / 1 kV / 10 kV
Digital Display of Set and Actual Values	Simultaneous 4 Digits Each	Simultaneous 4 Digits Each
Display Resolution	0.1 kV	0.1 kV
Accuracy	< ±1%	< ±1%
Reproducibility	±0.01% at Constant Temperature Level	±0.01% at Constant Temperature Level
Temperature Drift	< 65 ppm/°C	< 65 ppm/°C
<b>Tube Current</b>		
Preselection and Setting	From 0.1 to 45 mA in 0.01 mA / 0.1 mA / 1 mA	From 0.1 to 45 mA in 0.01 mA / 0.1 mA / 1 mA
Digital Display of Set and Actual Values	Simultaneous 4 Digits Each	Simultaneous 4 Digits Each
Display Resolution	0.1 mA / 0.01 mA	0.1 mA / 0.01 mA
Accuracy	± 1%	±1%
Reproducibility	± 0.01% at Constant Temperature Level	± 0.01% at Constant Temperature Level
Temperature Drift	< 65 ppm/°C	< 65 ppm/°C
<b>Exposure Time</b>		
Programmable Timer	Non-Volatile Memory	Non-Volatile Memory
Preselection and Setting	From 0.1 to 99.9 Minutes in 0.1 Min. Increments or From 1 to 999 Sec. in 1 Sec. Increments or as direct Min./Sec. value (up to 99'59")	From 0.1 to 99.9 Minutes in 0.1 Min. Increments or From 1 to 999 Sec. in 1 Sec. Increments or as direct Min./Sec. value (up to 99'59")
Digital Display of Set and Actual Values	The Remaining Time Is Displayed, i.e. After a Mains Failure Exposure Can Be Continued Without any Time Error	The Remaining Time Is Displayed, i.e. After a Mains Failure Exposure Can Be Continued Without any Time Error
<b>Prewarning Time</b>		
Preselection and Setting	Digital Setting From 2 to 250 Seconds or de-activated	Digital Setting From 2 to 250 Seconds or de-activated
<b>Programmed Mode</b>		
Number of Storable Programs	250	250
Warm-Up	Automatic Intelligent Tube conditioning based on Real-time Clock Extended warm-up for special conditioning	Automatic Intelligent Tube conditioning based on Real-time Clock Extended warm-up for special conditioning
X-ray Tube Setup	8 Tube selectable from a database of > 40 pre-programmed tubes	8 Tube selectable from a database of > 40 pre-programmed tubes
<b>Control Module</b>		
Dimensions (W x D x H)	460 x 270 x 100 mm (18.1" x 10.6" x 3.9") Built into Desk Housing	460 x 270 x 100 mm (18.1" x 10.6" x 3.9") Built into Desk Housing
Weight	4.9 kg (10.8 lbs) Including Desk Housing	4.9 kg (10.8 lbs) Including Desk Housing
<b>Connected Loads</b>		
Power connection	1N PE 230 V ± 10% 50/60 Hz 3N PE 400/230 V ±10%, 50/60 Hz, 3-Phase, Grounded Neutral TN-S or TN-C-S Mains (Star Connected System, Optional 3-Phase Isolation Transformer)	1N PE 230 V ± 10% 50/60 Hz 3N PE 400/230 V ±10%, 50/60 Hz, 3-Phase, Grounded Neutral TN-S or TN-C-S Mains (Star Connected System, Optional 3-Phase Isolation Transformer)
Grounding	Separate Grounding for X-ray Tube and High Voltage Generator (Minimum 6 mm <sup>2</sup> )	Separate Grounding for X-ray Tube and High Voltage Generator (Minimum 6 mm <sup>2</sup> )
Mains Fuses	63 A (1N PE) or 16 A (3N PE) Time-Delay Fuses, Customer-Supplied	63 A (1N PE) or 16 A (3N PE) Time-Delay Fuses, Customer-Supplied
Operating Temperature Range	0°C to +40°C	0°C to +40°C
Storage Temperature Range	-30°C to +70°C	-30°C to +70°C

# FAXITRON® CABINET X-RAY SYSTEMS

## MODELS 43855C & 43855D

### *Faxitron X-Ray Systems Offer:*

- Ease of operation
- High contrast, high resolution imaging
- Convenience and space savings
- Shielded, radiation safe enclosures

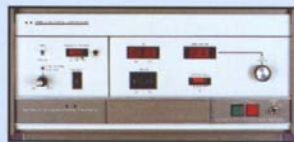


Faxitron Model 43855D



Faxitron Model 43855C

The Faxitron® Models 43855C and 43855D represent the latest evolution of the highly successful Faxitron product line. Over the last 30 years, Faxitrons have become the standard in small cabinet X-ray inspection systems. The Faxitron's size and radiation safe enclosure make it ideal for location almost anywhere. A modular design is utilized for easy service and upgrade. This unique design provides long life and safe, reliable operation to radiographic users needing an instrument they can depend on. Simple controls are utilized allowing operation by persons with no previous radiography training. These factors combined with a low purchase price make the



AO2, Automatic Exposure Control –  
Optionally available for  
the Model 43855C/D

Faxitron a great value and have resulted in the installation of over 5000 units worldwide. Faxitron X-ray Systems offer a variety of options which allow users to configure a unit meeting their specific needs. For example, three different X-ray sources are available on the Faxitron Models 43855 C/D including a microfocus X-ray source for radiographic magnification. Imaging is possible with X-ray film, radiographic paper or Polaroid® Film.

The Model 43855C also has several real-time X-ray imaging options which provide a fluoroscopic video image. Both models have a cable access port for instrumentation and future real-time upgrade.



**DETEK, Inc.**  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com



# SYSTEM SPECIFICATIONS

## MODELS 43855C & 43855D

### X-ray Sources:

There are five X-ray sources offered with the Faxitron Models 43855C & 43855D. The system comes standard with a 110kVp maximum source.

#### Standard Source

- Energy Range – 10 - 110kVp
- Tube Current – 3.0 mA fixed\*
- Focal Spot – 0.5mm, nominal
- X-Ray Tube – Stationary anode, glass tube with beryllium window (0.03" thick)
- Beam Angle – 30 degrees divergence

#### Option A04

- Energy Range – 10 - 130kVp
- Tube Current – 3.0 mA fixed\*
- Focal Spot – 0.5mm, nominal
- X-Ray Tube – Stationary anode, glass tube with beryllium window (0.03" thick)
- Beam Angle – 30 degrees divergence

#### Option A05

- Energy Range – 10 - 150kVp
- Tube Current – 3.0 mA fixed\*
- Focal Spot – 1.5mm, nominal
- X-Ray Tube – Stationary anode, glass tube with beryllium window (0.03" thick)
- Beam Angle – 40 degrees divergence

#### Option M110

- Energy Range – 10 - 110kVp
- Tube Current – 300  $\mu$ A fixed\*
- Focal Spot – 50  $\mu$ m, nominal
- X-Ray Tube – Stationary anode, glass tube with beryllium window (0.03" thick)
- Beam Angle – 30 degrees divergence

#### Option M130

- Energy Range – 10 - 130kVp
- Tube Current – 300  $\mu$ A fixed\*
- Focal Spot – 50  $\mu$ m, nominal
- X-Ray Tube – Stationary anode, glass tube with beryllium window (0.03" thick)
- Beam Angle – 30 degrees divergence

\* Tube current will be less than 3mA or 300 $\mu$ A for energies below 30 kVp.

### Power Requirements:

110 - 120 VAC/60 Hz or optional 220 - 230 VAC/50 Hz  
(600 VA total)

### Safety:

The Faxitron has a shielded cabinet and utilizes redundant safety interlocks. Certified to comply with standards set by the U.S. Food and Drug Administration, Center for Devices and Radiological Health, (21 CFR-1020.40). Most option configurations are classified by Underwriters Laboratories Inc. in the U.S. and Canada, with respect to electrical fire, shock, and mechanical hazards. Certified to comply with the European EMC Directive.



## MODEL 43855C

A floor standing cabinet X-ray system providing a maximum 52" film to source distance. The 43855C model can be ordered with all listed options and retrofitted for use with a microfocus X-ray source and/or real-time imaging components.

- Exposure Timer – 5 sec. to 60 min. (1 sec increments)
- Film to Source Distance – 14" min to 52" max  
(35 cm to 132 cm)
- Maximum Coverage – 24" diameter (61 cm)  
(fits a full 14" x 17" cassette)
- External Dimensions – 62" H x 24" W x 20" L  
(157cm x 61 cm x 51 cm)
- Internal Dimensions – 41" H x 18" W x 16.5" L  
(104 cm x 46 cm x 42 cm)
- Weight – 850 lb (386 kg)
- Shipping Weight – 960 lb (437 kg)

## MODEL 43855D

A table top X-ray system providing a maximum 28" film to source distance. The model "D" differs from the Model "C" only in its smaller beam coverage area and shorter film to source distance. The 43855D model can be ordered with all listed options and retrofitted for use with a microfocus X-ray source.

- Exposure Timer – 5 sec to 60 min (1 sec increments)
- Film to Source Distance – 12.0" min to 28" max  
(30.5 cm to 71 cm)
- Maximum Beam Coverage – 15" diameter (38 cm)
- External Dimensions – 40" H x 24" W x 20" L  
(102 cm x 61 cm x 51 cm)
- Internal Dimensions – 17" H x 18" W x 16.5" L  
(43 cm x 46 cm x 42 cm)
- Weight – 630 lb (286 kg)
- Shipping Weight – 740 lb (336 kg)

# FAXITRON® CABINET X-RAY SYSTEM MODEL 43855E



## *The Faxitron Model 43855E X-Ray System Offers:*

- HIGH RESOLUTION X-RAY IMAGING
- SPACIOUS CABINET DIMENSIONS FOR LARGER PARTS
- REALTIME OR FILM-BASED IMAGING OPTIONS
- SHIELDED, RADIATION SAFE ENCLOSURES
- EASE OF OPERATION
- CONVENIENCE AND SPACE SAVINGS
- OPTIONAL HORIZONTAL "SIDE-SHOOTING" CONFIGURATION

## *Typical Applications:*

- PRINTED CIRCUIT BOARDS
- CASTINGS
- PLASTIC INJECTION MOULDING
- AUTOMOTIVE PARTS
- AEROSPACE COMPONENTS
- ELECTRICAL/MECHANICAL COMPONENTS
- MEDICAL DEVICES



**DETEK, Inc.**  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com



## X-RAY SOURCES:

There are four different X-ray sources offered with the Faxitron Model 43855E:

	Standard Source	Option A04	Option M110	Option A05
Energy Range	10-110kVp	10-130kVp	10-110kVp	10-150kVp
Tube Current	3.0 mA fixed	3.0 mA fixed	300 $\mu$ A fixed	3.0 mA fixed
Focal Spot	0.5mm, nominal	0.5mm, nominal	50 $\mu$ m (-0+20 $\mu$ m)	1.5mm, nominal

### SYSTEM SPECIFICATIONS

- Exposure Timer - 5 sec. to 60 min.  
(1 sec. increments)
- Maximum Film to Source Distance - 41"
- External Dimensions - 71"h x 51"w x 35"l
- Internal Dimensions - 30"h x 42"w x 30"l
- Weight - 1,000 lbs.
- Shipping Weight - 1,300 lbs.
- Maximum PCB Inspection Size  
(Realtime with 6" Image Intensifier - 24" x 18")

### REAL-TIME IMAGING OPTIONS

- Image Intensifier - 4", 6", or 9"
- CCD Camera, 512 x 480 lines, fixed or auto zoom lens
- Motorized manipulator, 3 or 5 axis
- Thermal video printer, 4" x 5" format
- Digital image processing module
- 13" or 17" high resolution b/w video monitor

### POWER REQUIREMENTS

110 - 120 VAC/60 Hz or optional  
220 - 230 VAC/50 Hz (600 VA total)

### SAFETY

The Faxitron has a shielded cabinet and utilizes redundant safety interlocks. Certified to comply with standards set by U.S. Food and Drug Administration Center for Devices and Radiology Health, (21 CFR-1020.40). UL Pending.

*Specifications are subject to change without notice.*



## Industrial X-Ray

### **Bipolar Metal Ceramic Tubes** Overview



## Bipolar Metal Ceramic Tubes

### Overview and Configuration Information

#### About Bipolar Metal Ceramic X-Ray Tubes

The COMET Bipolar Metal Ceramic tubes are designed for use in demanding industrial applications like Security and Non-Destructive Testing.

The tube assembly consists of a Bipolar X-Ray tube and tube housing with two integrated high voltage receptacle sockets. The X-Ray proof housing has an integrated cooling system and is equipped with oil hose connections. 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 new 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 ( $< 1 \mu\text{m}$ ) up to 6 kW in output for more power demanding requirements. From the smallest footprint for use in portable units to 450 kV fixed gantry systems that are suitable for cargo screening.

#### Bipolar Metal Ceramic Tubes – Configuration Information

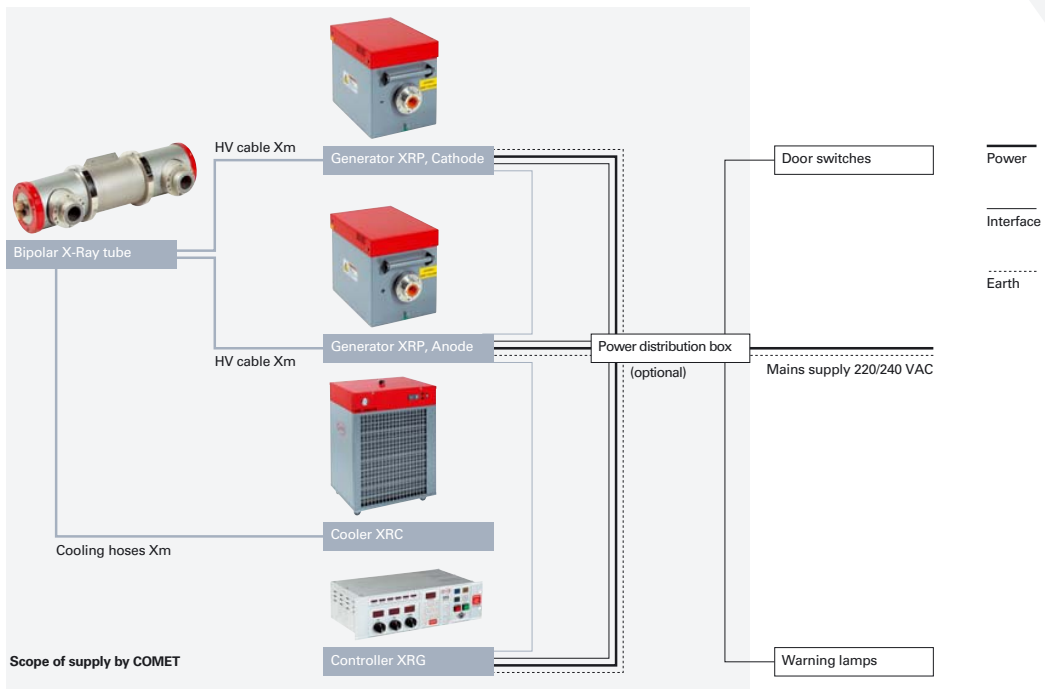
Overview of tubes and fitting module components; high voltage generator, high voltage cable and cooler.

Tube

Type	Ordering No.	Ordering No. with 90° housing	Nominal tube voltage	Continuous rating	Focal spot acc. EN 12543	Terminal type
<b>MXR-320/23</b>	<b>915334.51</b>	<b>915334.56</b>	320 kV	640 W / 1600 W	d = 1.9 mm / d = 3.6 mm	R24
<b>MXR-320/26</b>	<b>915358.51</b>	<b>915358.56</b>	320 kV	1500 W / 4200 W	d = 3.0 mm / d = 5.5 mm	R24
<b>MXR-320HP/21</b>	<b>915362.51</b>	<b>915362.56</b>	320 kV	900 W / 2000 W	d = 0.6 mm / d = 2.0 mm	R24
<b>MXR-321</b>	–	<b>915341.51</b>	320 kV	4000 W	d = 8 mm	R24
<b>MXR-322</b>	–	<b>915337.61</b>	320 kV	3200 W	d = 4.5 mm	R24
<b>MXR-350/23</b>	<b>915334.61</b>	<b>915334.66</b>	350 kV	640 W / 1600 W	d = 1.9 mm / d = 3.6 mm	R24
<b>MXR-350/26</b>	<b>915358.61</b>	<b>915358.66</b>	350 kV	1500 W / 4200 W	d = 3.0 mm / d = 5.5 mm	R24
<b>MXR-420/25</b>	<b>915331.51</b>	–	420 kV	1500 W / 4200 W	d = 3.0 mm / d = 7.0 mm	R24
<b>MXR-451/26</b>	<b>915344.53</b>	–	450 kV	900 W / 4500 W	d = 2.5 mm / d = 5.5 mm	R28
<b>MXR-451HP/21</b>	<b>915364.53</b>	–	450 kV	800 W / 1500 W	d = 0.6 mm / d = 1.0 mm	R28
<b>MXR-452</b>	<b>915344.51</b>	–	450 kV	900 W / 4500 W	d = 2.5 mm / d = 5.5 mm	R28

### Bipolar X-Ray Source

Diagram of a Bipolar X-Ray Source XRS and its environment.



Generator		High Voltage Cable	Cooler	
Type	Ordering No.	Type/Xm	Type	Ordering No.
XRP-320/1600/2	10002220	N3/160-R24-R24-Xm	XRC-3000-OW / XRC-3000-OA	10003804 / 10003803
XRP-320/4200/2	10002222	N3/160-R24-R24-Xm	XRC-4500-OW / XRC-4500-OA	10003535 / 10002535
XRP-320/4200/2	10002222	N3/160-R24-R24-Xm	XRC-3000-OW / XRC-3000-OA	10003804 / 10003803
XRP-320/4000/1	10002223	N3/160-R24-R24-Xm	XRC-4500-OW / XRC-4500-OA	10003535 / 10002535
XRP-320/3200/1	10002224	N3/160-R24-R24-Xm	XRC-4500-OW / XRC-4500-OA	10003535 / 10002535
XRP-350/1600/2	10003920	P3/250-R24-R24-Xm	XRC-3000-OW / XRC-3000-OA	10003804 / 10003803
XRP-350/4200/2	10003921	P3/250-R24-R24-Xm	XRC-4500-OW / XRC-4500-OA	10003535 / 10002535
XRP-450/4500/2	10002225	P3/250-R30-R24-Xm	XRC-4500-OW / XRC-4500-OA	10003535 / 10002535
XRP-450/4500/2	10002225	P3/250-R30-R28-Xm	XRC-4500-OW / XRC-4500-OA	10003535 / 10002535
XRP-450/4500/2	10002225	P3/250-R30-R28-Xm	XRC-3000-OW / XRC-3000-OA	10003804 / 10003803
XRP-450/4500/2	10002225	P3/250-R30-R28-Xm	XRC-4500-OW / XRC-4500-OA	10003535 / 10002535



**Bipolar Metal Ceramic Tubes**

Technical Data



**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
Former focal spot designation	0.8 / 1.8
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	3.0 V / 6.8 V
Inherent filtration	3.0 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
Former focal spot designation	1.5 / 4.0
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	2.6 V / 6.4 V
Inherent filtration	3.0 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/21**

Ordering No.	915362.51
Ordering No. with 90° housing	915362.56
Nominal tube voltage	320 kV
Continuous rating	900 W / 2000 W
Focal spot acc. EN 12543	d = 0.6 mm / d = 2.0 mm
Former focal spot designation	-
Filament current, max.	4.1 A / 4.6 A
Filament voltage, typical	3.0 V / 6.8 V
Inherent filtration	3.0 mm Be
Target material	W
Target angle	10°
Radiation coverage	40° x 20°
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

10001711

10001711

10001711

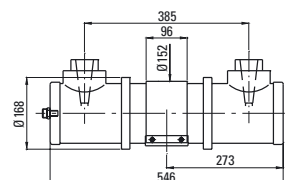
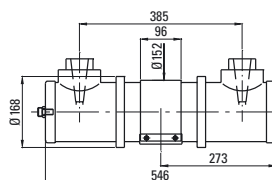
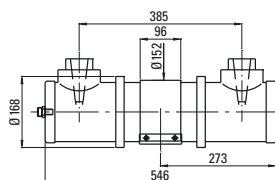
Locking device

940303

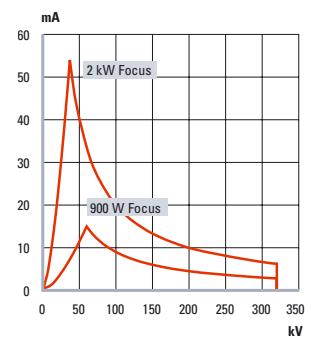
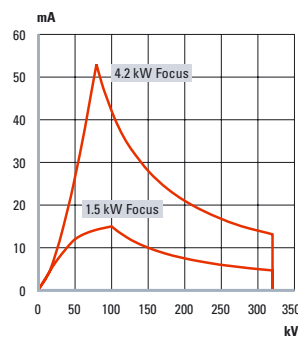
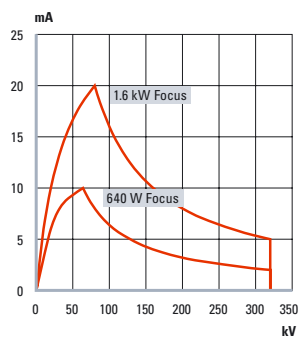
940303

940303

Outline drawing



Tube diagram





**MXR-321**



**MXR-322**



**MXR-350/23**



**MXR-350/26**

-
<b>915341.51</b>
320 kV
4000 W
d = 8 mm
5
4.6 A
6.4 V
3.0 mm Be
W
30°
40°
10 mSv/h
Oil
14 l/min
50° C
40 kg
R24

-
<b>915337.61</b>
320 kV
3200 W
d = 4.5 mm
2.0 x 3.0
4.6 A
6.4 V
0.2 mm Cu + 0.4 mm Fe
W
20°
80° x 8°
10 mSv/h
Oil
14 l/min
50° C
40 kg
R24

<b>915334.61</b>
<b>915334.66</b>
350 kV
640 W / 1600 W
d = 1.9 mm / d = 3.6 mm
0.8 / 1.8
4.9 A / 4.6 A
3.0 V / 6.8 V
3.0 mm Be
W
20°
40°
5 mSv/h
Oil
14 l/min
50° C
40 kg
R24

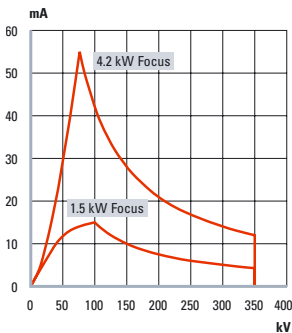
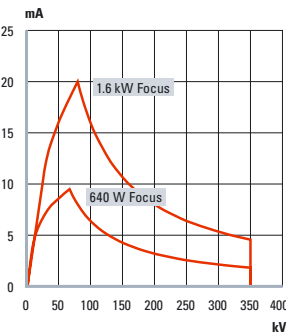
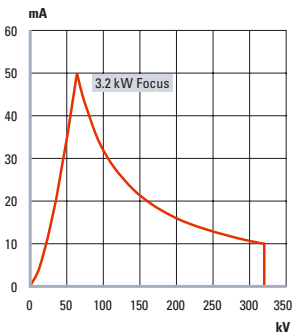
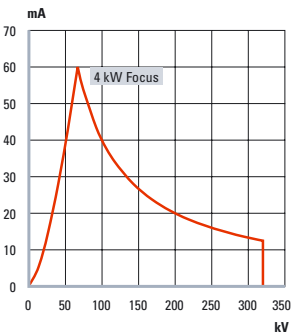
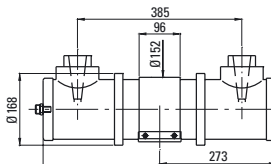
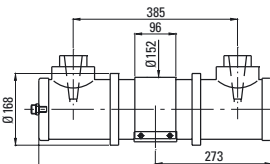
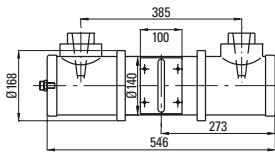
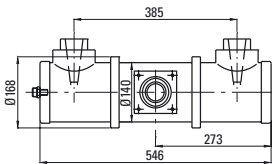
<b>915358.61</b>
<b>915358.66</b>
350 kV
1500 W / 4200 W
d = 3.0 mm / d = 5.5 mm
1.5 / 4.0
4.9 A / 4.6 A
2.6 V / 6.4 V
3.0 mm Be
W
20°
40°
5 mSv/h
Oil
14 l/min
50° C
40 kg
R24

10001711  
940303

10001711  
940303

10001711  
940303

10001711  
940303





**MXR-420/25**

Ordering No.	915331.51
Ordering No. with 90° housing	–
Nominal tube voltage	420 kV
Continuous rating	1500 W / 4200 W
Focal spot acc. EN 12543	d = 3.0 mm / d = 7.0 mm
Former focal spot designation	1.5 / 4.0
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	2.6 V / 6.4 V
Inherent filtration	3.0 mm Be
Target material	W
Target angle	20°
Radiation coverage	38°
Leakage radiation, max.	10 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	100 kg
Terminal type	R24



**MXR-451/26**

Ordering No.	915344.53
Ordering No. with 90° housing	–
Nominal tube voltage	450 kV
Continuous rating	900 W / 4500 W
Focal spot acc. EN 12543	d = 2.5 mm / d = 5.5 mm
Former focal spot designation	–
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	3.0 V / 6.8 V
Inherent filtration	3.0 mm + 2.0 mm Be
Target material	W
Target angle	30°
Radiation coverage	40°
Leakage radiation, max.	10 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	95 kg
Terminal type	R28



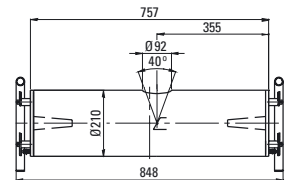
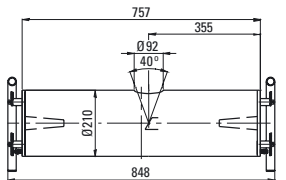
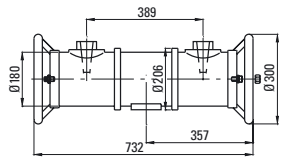
**MXR-451HP/21**

Ordering No.	915364.53
Ordering No. with 90° housing	–
Nominal tube voltage	450 kV
Continuous rating	800 W / 1500 W
Focal spot acc. EN 12543	d = 0.6 mm / d = 1.0 mm
Former focal spot designation	–
Filament current, max.	4.1 A / 4.6 A
Filament voltage, typical	3.0 V / 6.8 V
Inherent filtration	2.3 mm Fe + 1.0 mm Cu
Target material	W
Target angle	10°
Radiation coverage	20°
Leakage radiation, max.	10 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	95 kg
Terminal type	R28

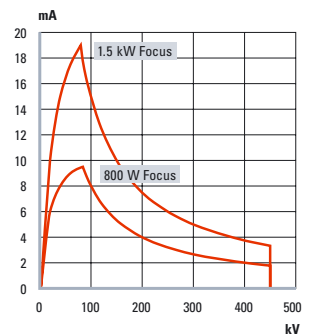
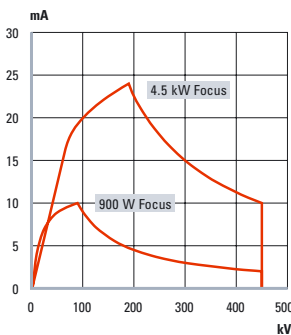
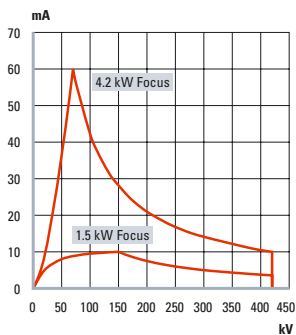
Ordering No.	915331.51
Ordering No. with 90° housing	–
Nominal tube voltage	420 kV
Continuous rating	1500 W / 4200 W
Focal spot acc. EN 12543	d = 3.0 mm / d = 7.0 mm
Former focal spot designation	1.5 / 4.0
Filament current, max.	4.9 A / 4.6 A
Filament voltage, typical	2.6 V / 6.4 V
Inherent filtration	3.0 mm Be
Target material	W
Target angle	20°
Radiation coverage	38°
Leakage radiation, max.	10 mSv/h
Cooling medium	Oil
Cooling medium flow, min.	14 l/min
Temperature at inlet, max.	50° C
Weight	100 kg
Terminal type	R24

Mounting flange	10001711
Locking device	940303

Outline drawing



Tube diagram

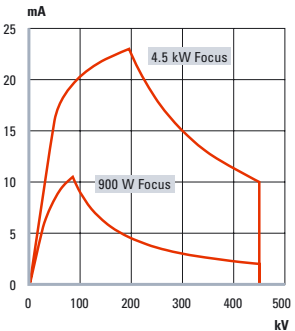
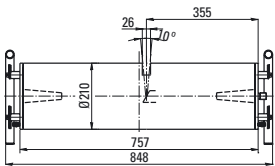




**MXR-452**

<b>915344.51</b>
-
450 kV
900 W / 4500 W
d = 2.5 mm / d = 5.5 mm
-
4.9 A / 4.6 A
3.0 V / 6.8 V
2.3 mm Fe + 1.0 mm Cu
W
30°
90° x 20°
10 mSv/h
Oil
14 l/min
50° C
95 kg
R28

10001710
-





COMET is a successful international technology company in the growth markets of security, inspection, electronics and communication. As an expert in the field of applied physics, COMET provides a complete and highly flexible portfolio of components, modules, systems and services from a single source.

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.

COMET – The X-perts for security, inspection, electronics and communication

June 2006  
Specifications subject to change without notice



## DETEK, Inc.

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

**800-638-0554**      **FAX 301-449-7011**  
www.detek.com      sales@detek.com



## Industrial X-Ray

### **Unipolar Metal Ceramic Tubes**

Overview

## Unipolar Metal Ceramic Tubes

### Overview and Configuration Information

#### About Unipolar Metal Ceramic X-Ray Tubes

The COMET Unipolar Metal Ceramic tubes are designed for use in demanding industrial applications like Non-Destructive Testing, Food Inspection and Thickness Gauging. The tube assembly consists of an Unipolar X-Ray tube with cooled anode at ground potential and a high voltage receptacle socket. The X-Ray proof tube housing has fittings for water hose connections. 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 Subsystems

COMET is pleased to offer all of the necessary components for a customized X-Ray Source: The new XRS Subsystems 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 subsystems 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 ( $< 1 \mu\text{m}$ ) up to 6 kW in output for more power demanding requirements. From the smallest footprint for use in portable units to 450 kV fixed gantry systems that are suitable for cargo screening.

#### Unipolar Metal Ceramic Tubes – Configuration Information

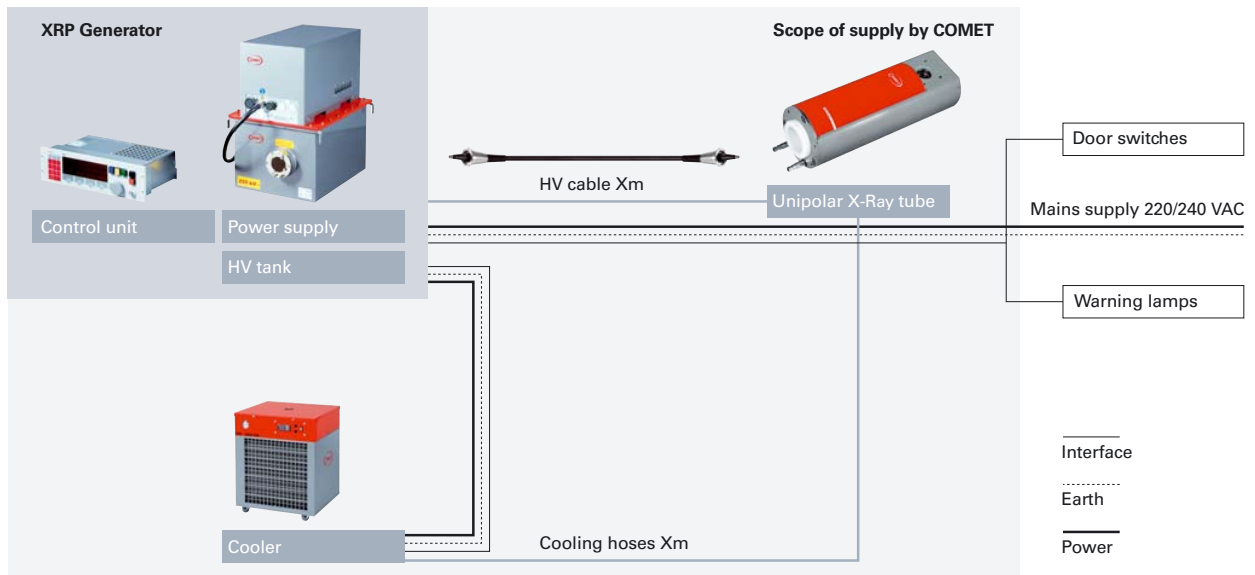
Overview of tubes and fitting system components; high voltage generator, high voltage cable and cooler.

Tube

Type	Ordering No.	Nominal tube voltage	Continuous rating	Focal spot acc. EN 12543	Terminal type
<b>MXR-101</b>	<b>915343.51</b>	100 kV	1000 W	d = 5.5 mm	R10
<b>MXR-160HP/11</b>	<b>915370.51</b>	160 kV	800 W / 1800 W	d = 0.4 mm / d = 1.0 mm	R24
<b>MXR-160HP/20</b>	<b>915357.51</b>	160 kV	1000 W / 1000 W	d = 1.0 mm / d = 1.0 mm	R24
<b>MXR-160/01</b>	<b>915313.51</b>	160 kV	320 W	d = 0.5 mm	R24
<b>MXR-160/20</b>	<b>915317.51</b>	160 kV	640 W / 640 W	d = 1.0 mm / d = 1.0 mm	R24
<b>MXR-160/21</b>	<b>915302.51</b>	160 kV	640 W / 1600 W	d = 1.0 mm / d = 3.0 mm	R24
<b>MXR-160/22</b>	<b>915301.51</b>	160 kV	640 W / 3000 W	d = 1.0 mm / d = 5.5 mm	R24
<b>MXR-161</b>	<b>915305.51</b>	160 kV	3000 W	d = 7.5 mm	R24
<b>MXRP-160C</b>	<b>915311.51</b>	160 kV	1000 W	l = 0.4 mm / w = 4.0 mm	R24
<b>MXR-225HP/11</b>	<b>915371.51</b>	225 kV	800 W / 1800 W	d = 0.4 mm / d = 1.0 mm	R24
<b>MXR-225/21</b>	<b>915325.51</b>	225 kV	640 W / 1600 W	d = 1.0 mm / d = 3.0 mm	R24
<b>MXR-225/22</b>	<b>915326.51</b>	225 kV	640 W / 3000 W	d = 1.0 mm / d = 5.5 mm	R24
<b>MXR-226</b>	<b>915332.51</b>	225 kV	3000 W	d = 7.5 mm	R24

### Unipolar X-Ray Source

Diagram of a Unipolar X-Ray Source XRS and its environment.



Generator		High Voltage Cable	Cooler			
Type	Ordering No.	Type/Xm	Type	Ordering No.	Type 2	Ordering No. 2
XRP-160/4500/2	10006465	U3/100-R24-R10-Xm	XRC-1000-WA	10002533	-	-
XRP-160/4500/2	10006465	N3/160-R24-R24-Xm	XRC-3000-WA	10002534	XRC-3000-WW	10004730
XRP-160/4500/2	10006465	N3/160-R24-R24-Xm	XRC-1000-WA	10002533	-	-
XRP-160/4500/2	10006465	N3/160-R24-R24-Xm	XRC-1000-WA	10002533	-	-
XRP-160/4500/2	10006465	N3/160-R24-R24-Xm	XRC-1000-WA	10002533	-	-
XRP-160/4500/2	10006465	N3/160-R24-R24-Xm	XRC-3000-WA	10002534	XRC-3000-WW	10004730
XRP-160/4500/2	10006465	N3/160-R24-R24-Xm	XRC-3000-WA	10002534	XRC-3000-WW	10004730
XRP-160/4500/2	10006465	N3/160-R24-R24-Xm	XRC-3000-WA	10002534	XRC-3000-WW	10004730
XRP-160/4500/2	10006465	N3/160-R24-R24-Xm	XRC-1000-WA	10002533	-	-
XRP-225/4500/2	10006466	P3/250-R28-R24-Xm	XRC-3000-WA	10002534	XRC-3000-WW	10004730
XRP-225/4500/2	10006466	P3/250-R28-R24-Xm	XRC-3000-WA	10002534	XRC-3000-WW	10004730
XRP-225/4500/2	10006466	P3/250-R28-R24-Xm	XRC-3000-WA	10002534	XRC-3000-WW	10004730
XRP-225/4500/2	10006466	P3/250-R28-R24-Xm	XRC-3000-WA	10002534	XRC-3000-WW	10004730



Unipolar Metal Ceramic Tubes

Technical Data



**MXR-101**

<b>Ordering No.</b>	<b>915343.51</b>
<b>Nominal tube voltage</b>	100 kV
<b>Continuous rating</b>	1000 W
<b>Focal spot acc. EN 12543</b>	d = 5.5 mm
<b>Former focal spot designation</b>	4
<b>Filament current, max.</b>	4.2 A
<b>Filament voltage, typical</b>	7.5 V
<b>Inherent filtration</b>	0.8 mm Be
<b>Target material</b>	W
<b>Target angle</b>	30°
<b>Radiation coverage</b>	40°
<b>Leakage radiation, max.</b>	-
<b>Cooling medium</b>	Water
<b>Cooling medium flow, min.</b>	4 l/min
<b>Temperature at inlet, max.</b>	40° C
<b>Weight</b>	3.5 kg
<b>Terminal type</b>	R10

**MXR-160HP/11**

<b>Ordering No.</b>	<b>915370.51</b>
<b>Nominal tube voltage</b>	160 kV
<b>Continuous rating</b>	800 W / 1800 W
<b>Focal spot acc. EN 12543</b>	d = 0.4 mm / d = 1.0 mm
<b>Former focal spot designation</b>	-
<b>Filament current, max.</b>	4.1 A / 4.1 A
<b>Filament voltage, typical</b>	2.9 V / 7.3 V
<b>Inherent filtration</b>	0.8 mm Be
<b>Target material</b>	W
<b>Target angle</b>	11°
<b>Radiation coverage</b>	40° x 30°
<b>Leakage radiation, max.</b>	2.5 mSv/h
<b>Cooling medium</b>	Water
<b>Cooling medium flow, min.</b>	4 l/min
<b>Temperature at inlet, max.</b>	35° C
<b>Weight</b>	8 kg
<b>Terminal type</b>	R24

**MXR-160HP/20**

<b>Ordering No.</b>	<b>915357.51</b>
<b>Nominal tube voltage</b>	160 kV
<b>Continuous rating</b>	1000 W / 1000 W
<b>Focal spot acc. EN 12543</b>	d = 1.0 mm / d = 1.0 mm
<b>Former focal spot designation</b>	0.4 / 0.4
<b>Filament current, max.</b>	4.1 A / 4.1 A
<b>Filament voltage, typical</b>	4.2 V / 4.2 V
<b>Inherent filtration</b>	0.8 mm Be
<b>Target material</b>	W
<b>Target angle</b>	20°
<b>Radiation coverage</b>	40°
<b>Leakage radiation, max.</b>	2.5 mSv/h
<b>Cooling medium</b>	Water
<b>Cooling medium flow, min.</b>	4 l/min
<b>Temperature at inlet, max.</b>	35° C
<b>Weight</b>	8 kg
<b>Terminal type</b>	R24

Mounting flange

651142

10001756

10001756

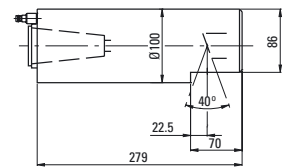
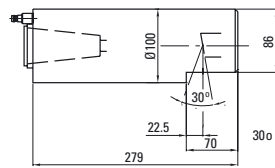
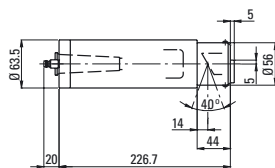
Locking device

-

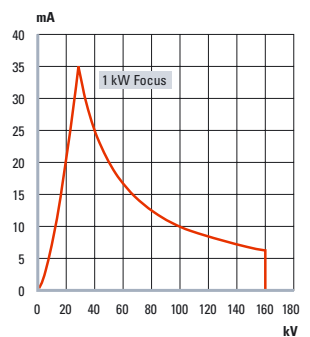
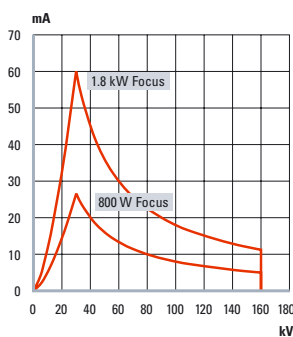
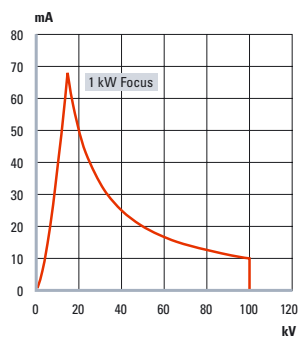
941002

941002

Outline drawing



Tube diagram





**MXR-160/01**

**915313.51**

160 kV

320 W

d = 0.5 mm

0.2

3.3 A

4.5 V

0.8 mm Be

W

10°

40° x 30°

2.5 mSv/h

Water

4 l/min

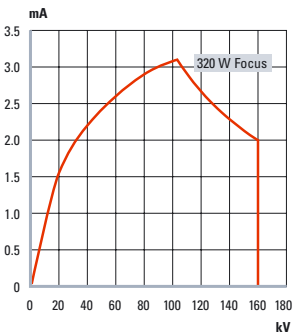
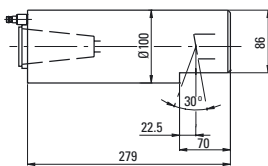
35° C

8 kg

R24

10001756

941002



**MXR-160/20**

**915317.51**

160 kV

640 W / 640 W

d = 1.0 mm / d = 1.0 mm

0.4 / 0.4

4.1 A / 4.1 A

4.2 V / 4.2 V

0.8 mm Be

W

20°

40°

2.5 mSv/h

Water

4 l/min

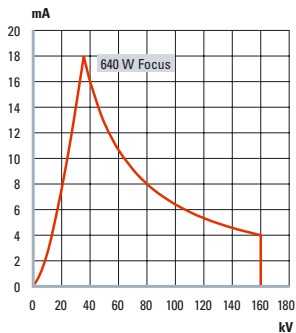
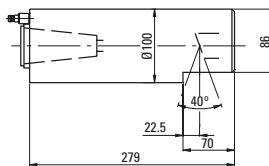
35° C

8 kg

R24

10001756

941002



**MXR-160/21**

**915302.51**

160 kV

640 W / 1600 W

d = 1.0 mm / d = 3.0 mm

0.4 / 1.5

4.1 A / 4.2 A

4.2 V / 5.5 V

0.8 mm Be

W

20°

40°

2.5 mSv/h

Water

4 l/min

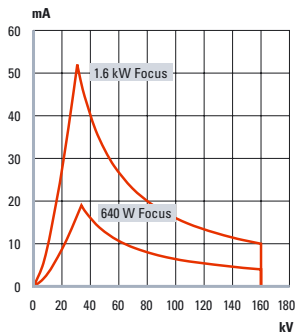
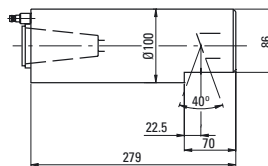
35° C

8 kg

R24

10001756

941002



**MXR-160/22**

**915301.51**

160 kV

640 W / 3000 W

d = 1.0 mm / d = 5.5 mm

0.4 / 3.0

4.1 A / 4.2 A

3.0 V / 5.5 V

0.8 mm Be

W

20°

40°

2.5 mSv/h

Water

4 l/min

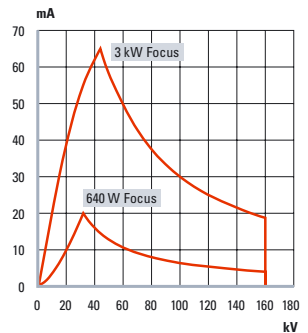
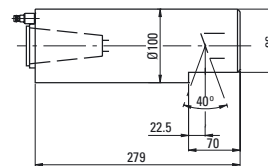
35° C

8 kg

R24

10001756

941002





**MXR-161**

<b>Ordering No.</b>	<b>915305.51</b>
<b>Nominal tube voltage</b>	160 kV
<b>Continuous rating</b>	3000 W
<b>Focal spot acc. EN 12543</b>	d = 7.5 mm
<b>Former focal spot designation</b>	3.0 x 6.0
<b>Filament current, max.</b>	4.2 A
<b>Filament voltage, typical</b>	5.5 V
<b>Inherent filtration</b>	0.8 mm Be
<b>Target material</b>	W
<b>Target angle</b>	30°
<b>Radiation coverage</b>	40°
<b>Leakage radiation, max.</b>	1 mSv/h
<b>Cooling medium</b>	Water
<b>Cooling medium flow, min.</b>	4 l/min
<b>Temperature at inlet, max.</b>	35° C
<b>Weight</b>	8 kg
<b>Terminal type</b>	R24

**MXRP-160C**

<b>Ordering No.</b>	<b>915311.51</b>
<b>Nominal tube voltage</b>	160 kV
<b>Continuous rating</b>	1000 W
<b>Focal spot acc. EN 12543</b>	l = 0.4 mm / w = 4.0 mm
<b>Former focal spot designation</b>	0.3 x 3.0
<b>Filament current, max.</b>	4.2 A
<b>Filament voltage, typical</b>	2.7 V
<b>Inherent filtration</b>	0.5 mm Ti + 2.0 mm H <sub>2</sub> O + 2.0 mm Al
<b>Target material</b>	W
<b>Target angle</b>	22°
<b>Radiation coverage</b>	360° x 40°
<b>Leakage radiation, max.</b>	2.5 mSv/h
<b>Cooling medium</b>	Water
<b>Cooling medium flow, min.</b>	4 l/min
<b>Temperature at inlet, max.</b>	35° C
<b>Weight</b>	8 kg
<b>Terminal type</b>	R24

**MXR-165**

<b>Ordering No.</b>	<b>915356.51</b>
<b>Nominal tube voltage</b>	160 kV
<b>Continuous rating</b>	6000 W
<b>Focal spot acc. EN 12543</b>	d = 5.5 mm
<b>Former focal spot designation</b>	-
<b>Filament current, max.</b>	4.2 A
<b>Filament voltage, typical</b>	5.5 V
<b>Inherent filtration</b>	4 mm Be
<b>Target material</b>	W
<b>Target angle</b>	30°
<b>Radiation coverage</b>	45°
<b>Leakage radiation, max.</b>	2.5 mSv/h
<b>Cooling medium</b>	Water
<b>Cooling medium flow, min.</b>	5 l/min
<b>Temperature at inlet, max.</b>	30° C
<b>Weight</b>	9.4 kg
<b>Terminal type</b>	R24

**Mounting flange**

10001756

10001756

10001756

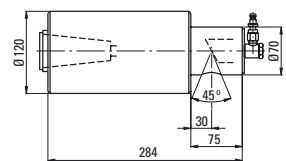
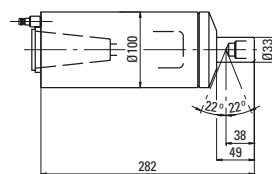
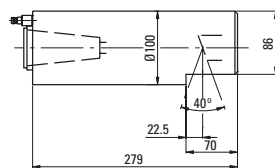
**Locking device**

941002

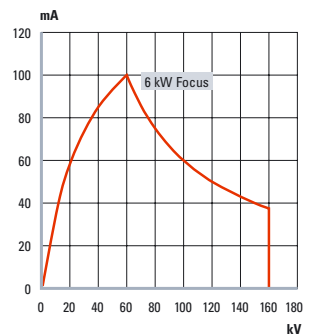
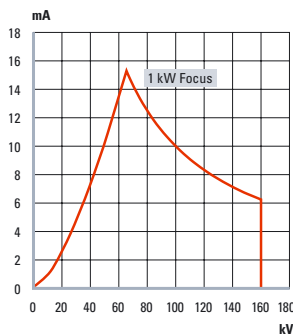
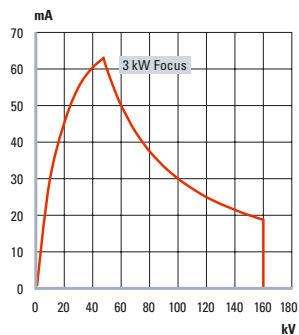
941002

940303

**Outline drawing**



**Tube diagram**





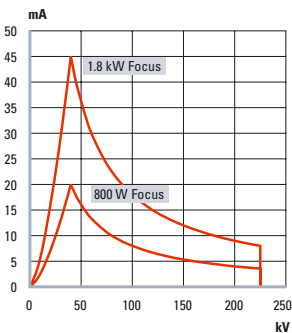
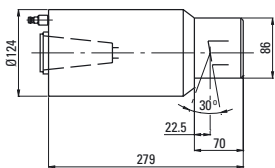
**MXR-225HP/11**

**915371.51**

225 kV  
800 W / 1800 W  
d = 0.4 mm / d = 1.0 mm  
–  
4.1 A / 4.1 A  
2.9 V / 7.3 V  
0.8 mm Be

W  
11°  
40° x 30°  
5 mSv/h  
Water  
4 l/min  
35° C  
11 kg  
R24

10001756  
941002



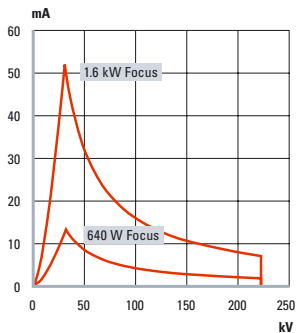
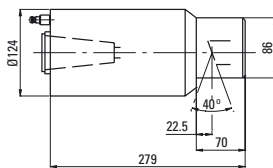
**MXR-225/21**

**915325.51**

225 kV  
640 W / 1600 W  
d = 1.0 mm / d = 3.0 mm  
0.4 / 1.5  
4.1 A / 4.2 A  
4.2 V / 5.5 V  
0.8 mm Be

W  
20°  
40°  
10 mSv/h  
Water  
4 l/min  
35° C  
11 kg  
R24

10001756  
941002



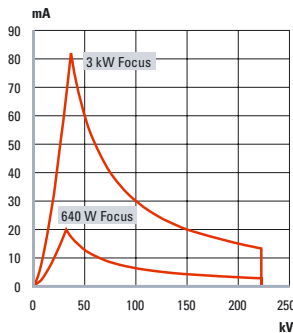
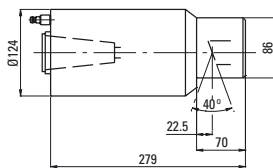
**MXR-225/22**

**915326.51**

225 kV  
640 W / 3000 W  
d = 1.0 mm / d = 5.5 mm  
0.4 / 3.0  
4.1 A / 4.2 A  
3.0 V / 5.5 V  
0.8 mm Be

W  
20°  
40°  
10 mSv/h  
Water  
4 l/min  
35° C  
11 kg  
R24

10001756  
941002



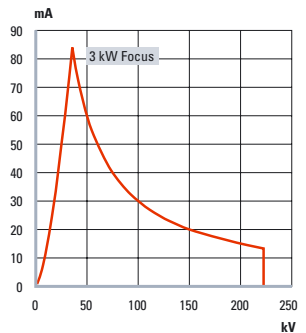
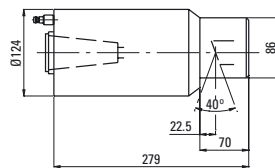
**MXR-226**

**915332.51**

225 kV  
3000 W  
d = 7.5 mm  
3.0 x 6.0  
4.2 A  
5.5 V  
0.8 mm Be

W  
30°  
40°  
10 mSv/h  
Water  
4 l/min  
35° C  
11 kg  
R24

10001756  
941002





COMET is a successful international technology company in the growth markets of security, inspection, electronics and communication. As an expert in the field of applied physics, COMET provides a complete and highly flexible portfolio of components, modules, systems and services from a single source.

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.

COMET – The X-perts for security, inspection, electronics and communication



**DETEK, Inc.**  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
**800-638-0554    FAX 301-449-7011**  
www.detek.com    sales@detek.com

A close-up photograph of a large industrial X-ray tube. The tube is made of a reddish-brown metal and has a large circular opening on its side. The interior of the tube is dark and reflective. The tube is positioned diagonally across the frame, with a dark blue background behind it.

## Industrial X-Ray

### High Power Tubes

Overview

## High Power Tubes

### Overview

#### High Power HP Technology for X-Ray Tubes

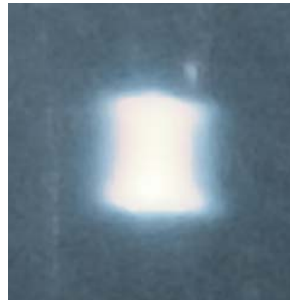
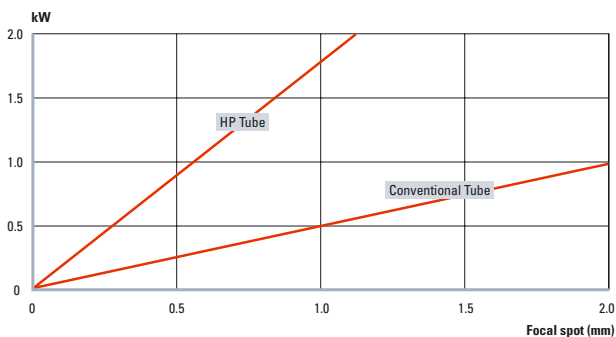
Since the invention of the X-Ray tube in 1895, the ratio between focal spot size and power has not improved significantly.

COMET AG has achieved a breakthrough in this historical relation with its new High Power (HP) technology. The HP family of X-Ray tubes has nearly doubled the power density of the conventional fixed-anode X-Ray tube.

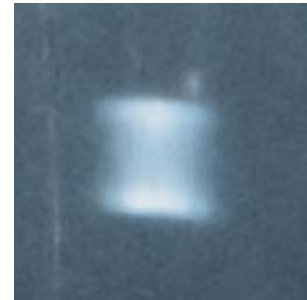
#### The Benefit of the HP Innovation

- Higher power with the same focal spot size. With higher power, shorter exposure times are necessary. The result is higher throughput through the inspection process.
- Smaller focal spot at the same power. Previously, when striving for finer resolution, the customer had to sacrifice power (and thus throughput) to achieve a smaller focal spot. You must no longer suffer this compromise.

#### Power/Focal Spot Ratio



1 mm focal spot of a conventional MXR-160/20. At 640 W (maximum power) the temperature reaches 1500° C.



1 mm focal spot of the HP tube MXR-160HP/20, same focal spot size, same power, but with 900° C, a significantly lower temperature. The power can be increased to 1000 W before the temperature reaches 1500° C.

#### The Demanding Challenge to Increase the Power Density of an X-Ray Tube

X-Ray tubes operate in extreme conditions:

- Ultra high vacuum technology ( $10^{-9}$  mbar)
- Temperatures up to 1500° C
- Rough environment

To make an X-Ray tube more efficient, one must go to work on the focal spot, the very small place where the electron beam strikes the heavy-metal target and produces X-Rays. The power dissipation by a standard X-Ray tube is approx 300 W/mm<sup>2</sup>. With our revolutionary new construction of the anode we can reach 600 W/mm<sup>2</sup>. This success of COMET's development team was the result of the convergence of unconventional thinking, the use of the latest simulation techniques and more than 50 years of experience in the construction of X-Ray tubes.

### What Are the Trends?

In the coming years, digital detectors will increasingly replace traditional X-Ray techniques such as film and image intensifiers. The consumer's demand for cost-effective products dictates that everything must be more efficient. Everything must move faster. Cycle times must be shorter. With digital detectors, already flux-starved imaging chains will be at their limits just to produce adequate pictures.

The public's increasing demand for safer products will push manufacturers to find ever smaller defects, thus increasing the need for high-resolution X-Ray inspection.

### Our Response

To meet the challenges evoked by these trends, COMET invented the HP technology and thereby revolutionized the X-Ray industry.

Smaller focal spots with more power enable our customers to develop "best in class" solutions.

Today, COMET offers a broad portfolio of tubes based on HP technology in the range from 160 kV to 450 kV.

### 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 ( $< 1 \mu\text{m}$ ) up to 6 kW in output for more power demanding requirements. From the smallest footprint for use in portable units to 450 kV fixed gantry systems that are suitable for cargo screening.

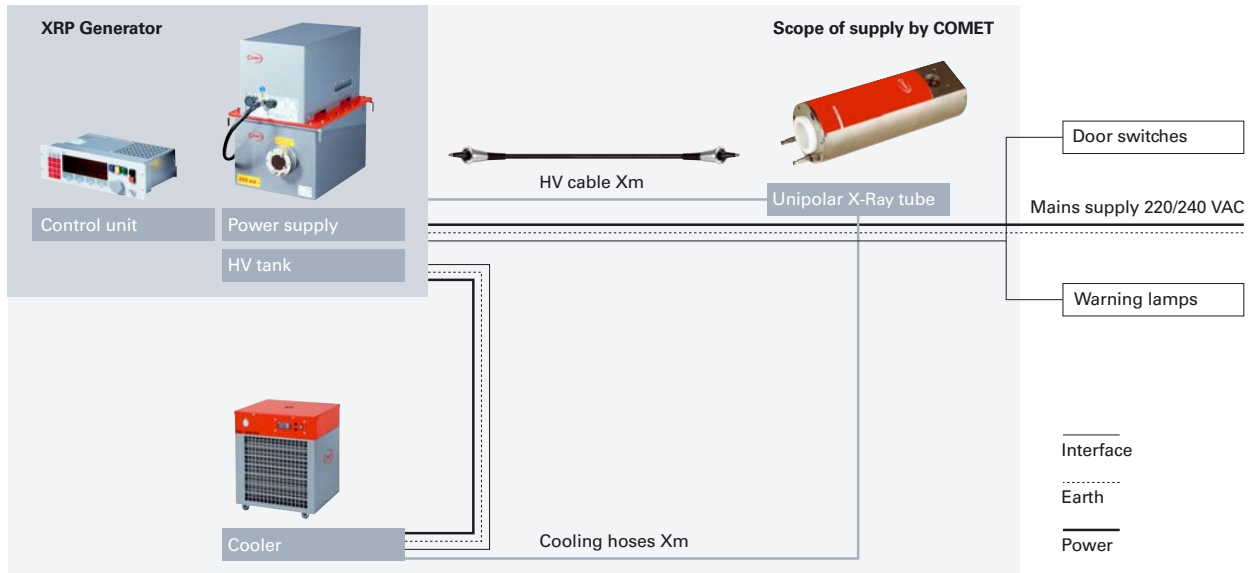


**High Power Tubes**

Overview and Configuration Information

**Unipolar X-Ray Source**

Diagram of a Unipolar X-Ray Source XRS and its environment.



**“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 new 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.

**High Power Tubes – Configuration Information**

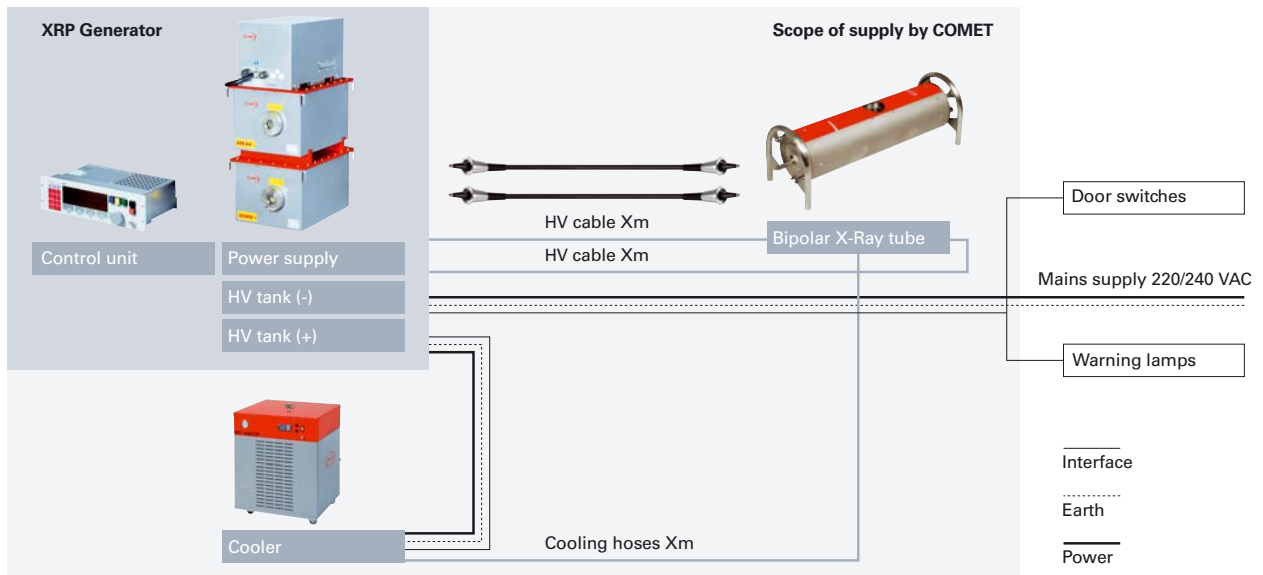
Overview of tubes and fitting module components; high voltage generator, high voltage cable and cooler.

Tube

Type	Ordering No.	Ordering No. with 90° housing	Nominal tube voltage	Continuous rating	Focal spot acc. EN 12543	Terminal type
<b>MXR-160HP/11</b>	<b>915370.51</b>	–	160 kV	800 W / 1800 W	d = 0.4 mm / d = 1.0 mm	R24
<b>MXR-160HP/20</b>	<b>915357.51</b>	–	160 kV	1000 W / 1000 W	d = 1.0 mm / d = 1.0 mm	R24
<b>MXR-225HP/11</b>	<b>915371.51</b>	–	225 kV	800 W / 1800 W	d = 0.4 mm / d = 1.0 mm	R24
<b>MXR-320HP/11</b>	<b>915368.51</b>	–	320 kV	800 W / 1800 W	d = 0.4 mm / d = 1.0 mm	R24
<b>MXR-451HP/11</b>	<b>915369.51</b>	–	450 kV	700 W / 1500 W	d = 0.4 mm / d = 1.0 mm	R28

### Bipolar X-Ray Source

Diagram of a Bipolar X-Ray Source XRS and its environment.



Generator		High Voltage Cable		Cooler	
Type	Ordering No.	Type/Xm		Type	Ordering No.
XRP-160/4500/2	10006465	N3/160-R24-R24-Xm		XRC-3000-WA	10002534
XRP-160/4500/2	10006465	N3/160-R24-R24-Xm		XRC-3000-WW	10004730
XRP-225/4500/2	10006466	P3/250-R28-R24-Xm		XRC-1000-WA	10002533
XRP-320/4500/2	10006467	N3/160-R24-R24-Xm		XRC-3000-WA	10002534
XRP-450/4500/2	10006468	P3/250-R28-R28-Xm		XRC-3000-WW	10004730
				XRC-4500-OW	10003535
				XRC-4500-OA	10002535
				XRC-4500-OW	10003535
				XRC-4500-OA	10002535

High Power Tubes

Technical Data



**MXR-160HP/11**

<b>Ordering No.</b>	<b>915370.51</b>
<b>Ordering No. with 90° housing</b>	–
<b>Nominal tube voltage</b>	160 kV
<b>Continuous rating</b>	800 W / 1800 W
<b>Focal spot acc. EN 12543</b>	d = 0.4 mm / d = 1.0 mm
<b>Former focal spot designation</b>	–
<b>Filament current, max.</b>	4.1 A / 4.1 A
<b>Filament voltage, typical</b>	2.9 V / 7.3 V
<b>Inherent filtration</b>	0.8 mm Be
<b>Target material</b>	W
<b>Target angle</b>	11°
<b>Radiation coverage</b>	40° x 30°
<b>Leakage radiation, max.</b>	2.5 mSv/h
<b>Cooling medium</b>	Water
<b>Cooling medium flow, min</b>	4 l/min
<b>Anode temperature, max.</b>	–
<b>Temperature at inlet, max.</b>	35° C
<b>Weight</b>	8 kg
<b>Terminal type</b>	R24

**MXR-160HP/20**

<b>Ordering No.</b>	<b>915357.51</b>
<b>Ordering No. with 90° housing</b>	–
<b>Nominal tube voltage</b>	160 kV
<b>Continuous rating</b>	1000 W / 1000 W
<b>Focal spot acc. EN 12543</b>	d = 1.0 mm / d = 1.0 mm
<b>Former focal spot designation</b>	–
<b>Filament current, max.</b>	4.1 A / 4.1 A
<b>Filament voltage, typical</b>	4.2 V / 4.2 V
<b>Inherent filtration</b>	0.8 mm Be
<b>Target material</b>	W
<b>Target angle</b>	20°
<b>Radiation coverage</b>	40°
<b>Leakage radiation, max.</b>	2.5 mSv/h
<b>Cooling medium</b>	Water
<b>Cooling medium flow, min</b>	4 l/min
<b>Anode temperature, max.</b>	–
<b>Temperature at inlet, max.</b>	35° C
<b>Weight</b>	8 kg
<b>Terminal type</b>	R24

**MXR-225HP/11**

<b>Ordering No.</b>	<b>915371.51</b>
<b>Ordering No. with 90° housing</b>	–
<b>Nominal tube voltage</b>	225 kV
<b>Continuous rating</b>	800 W / 1800 W
<b>Focal spot acc. EN 12543</b>	d = 0.4 mm / d = 1.0 mm
<b>Former focal spot designation</b>	–
<b>Filament current, max.</b>	4.1 A / 4.1 A
<b>Filament voltage, typical</b>	2.9 V / 7.3 V
<b>Inherent filtration</b>	0.8 mm Be
<b>Target material</b>	W
<b>Target angle</b>	11°
<b>Radiation coverage</b>	40° x 30°
<b>Leakage radiation, max.</b>	5 mSv/h
<b>Cooling medium</b>	Water
<b>Cooling medium flow, min</b>	4 l/min
<b>Anode temperature, max.</b>	–
<b>Temperature at inlet, max.</b>	35° C
<b>Weight</b>	11 kg
<b>Terminal type</b>	R24

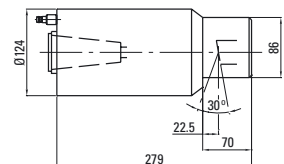
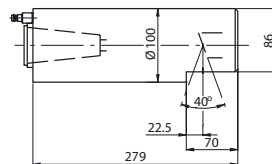
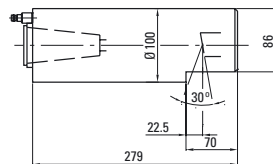
**Mounting flange**  
**Locking device**

<b>Mounting flange</b>	10001756
<b>Locking device</b>	941002

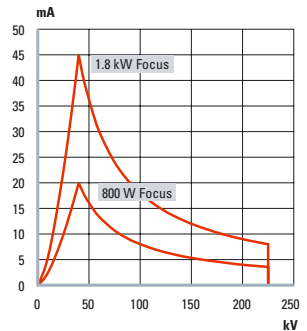
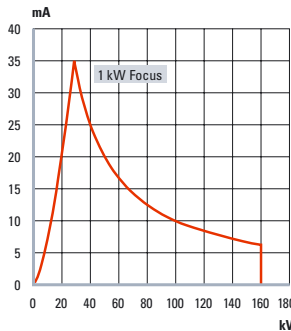
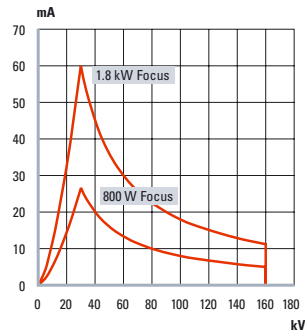
<b>Mounting flange</b>	10001756
<b>Locking device</b>	941002

<b>Mounting flange</b>	10001756
<b>Locking device</b>	941002

**Outline drawing**



**Tube diagram**



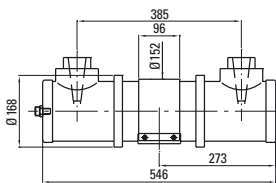


**MXR-320HP/11**

<b>915368.51</b>
–
320 kV
800 W / 1800 W
d = 0.4 mm / d = 1.0 mm
–
4.1 A / 4.6 A
2.3 V / 6.8 V
3 mm Be
W
11°
40° x 30°
5 mSv/h
Oil
14 l/min
–
50° C
40 kg
R24

10001711

–

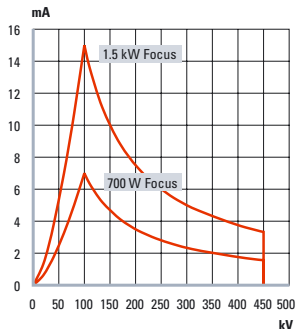
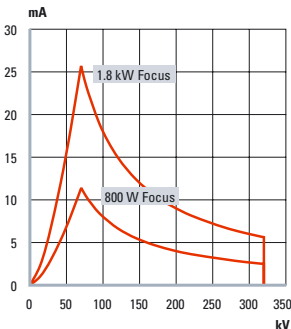
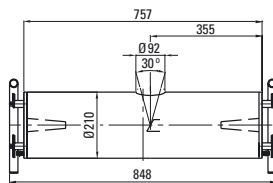


**MXR-451HP/11**

<b>915369.51</b>
–
450 kV
700 W / 1500 W
d = 0.4 mm / d = 1.0 mm
–
4.1 A / 4.6 A
2.3 V / 6.8 V
5 mm Be
W
11°
40° x 30°
5 mSv/h
Oil
14 l/min
–
50° C
95 kg
R28

10001710

–





COMET is a successful international technology company in the growth markets of security, inspection, electronics and communication. As an expert in the field of applied physics, COMET provides a complete and highly flexible portfolio of components, modules, systems and services from a single source.

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.

COMET – The X-perts for security, inspection, electronics and communication



**DETEK, Inc.**  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
**800-638-0554    FAX 301-449-7011**  
www.detek.com    sales@detek.com



Cable Flange  
651136



## Industrial X-Ray

**Cables, Flanges, Quick Locks**  
Overview



## Cable Types and Flanges

Technical Data, Configurations, Combinations

### Technical Data Cables

	U3/100	N3/160	P3/250
Rated voltage	100 kVDC	160 kVDC	250 kVDC
Nominal outside diameter	20mm	29mm	36mm
Coverage shielding braid	>95%	>95%	>80%
Conductor resistance Bare Conductor @ 20°C	6.6 mΩ/m	6.6 mΩ/m	6.6 mΩ/m
Conductor resistance Red & White Cond. @ 20°C	9.5 mΩ/m	11.4 mΩ/m	11.4 mΩ/m
Minimum bending radius (dynamic)	80 mm	120 mm	148 mm
Insulation resistance (wires to shield)	$\geq 5 \times 10^{12} \Omega \cdot m$	$\geq 1 \times 10^{12} \Omega \cdot m$	$\geq 1 \times 10^{12} \Omega \cdot m$
Capacitance (wires to shield)	136 pF/m	126 pF/m	107 pF/m
Max. operating temperature	+70°C	+70°C	+70°C

### Configurations with COMET Tubes

Cable	MXR-101	CXR-10X	CXR-150	MXR-160	MXR-225	MXR-320	MXR-350	MXR-420	MXR-45X	Power Supply
U3/100	R10	R10								
N3/160			R24	R24		R24				
P3/250					R24		R24	R24	R28	R24 R30

### Cable flange

#### Ordering No.

651142	■									
100001700		■								
100001710									■	
100001711			■			■	■	■		
100001756				■	■					
651136										■
651138										

### Locking device

#### Ordering No.

941002				■	■					
940303			■			■	■	■		
651053			■	■	■	■	■	■		

### Combinations

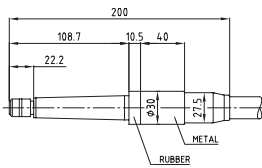
	R10	R24	R24 RA	R28	R28 RA	R30	R30 RA
U3/100 cable	100 kV	100 kV	100 kV	–	–	–	–
N3/160 cable	–	160 kV	160 kV	160 kV	160 kV	160 kV	160 kV
P3/250 cable	–	225 kV	225 kV	225 kV	225 kV	225 kV	225 kV

Within the high voltage system the part with the lowest specified high voltage rating defines the maximum allowed voltage.

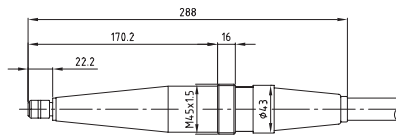
Special cables, terminals and flanges are available on request. Please contact us. [xray@comet.ch](mailto:xray@comet.ch)

Plugs

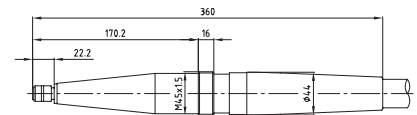
R10 with U3 cable



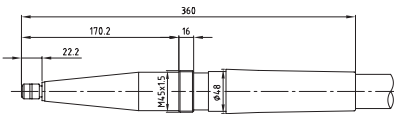
R24 with U3 cable



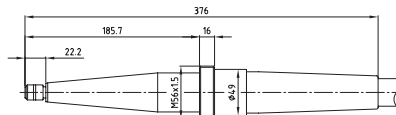
R24 with N3 cable



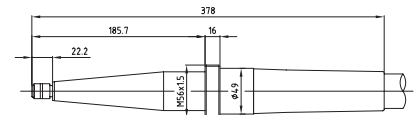
R24 with P3 cable



R28 with N3 cable



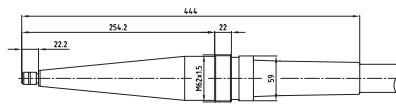
R28 with P3 cable



R30 with N3 cable



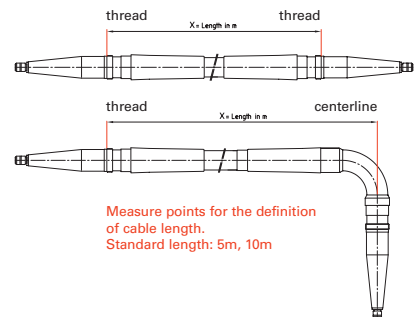
R30 with P3 cable



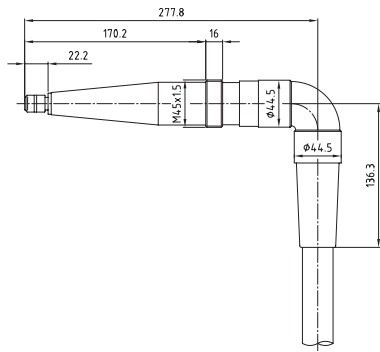
Ordering Example

	cable	-	plug	-	plug	-	length
Cable	N3/160	-	R24	-	R24 RA	-	5m
Flange	10001756						

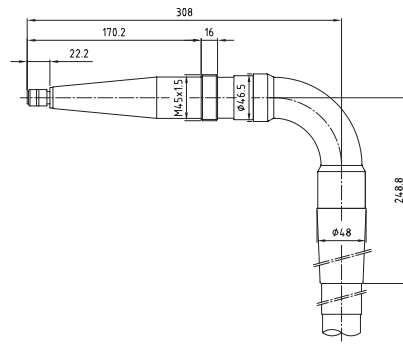
Example: 160 kV cable with straight and rectangular connector, length 5m with a flange for MXR-160.



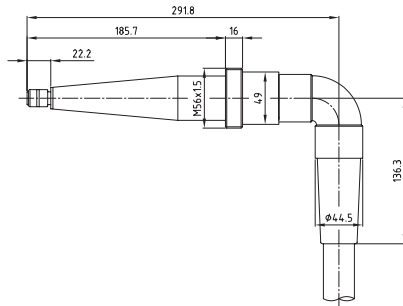
**R24 RA with N3 cable**



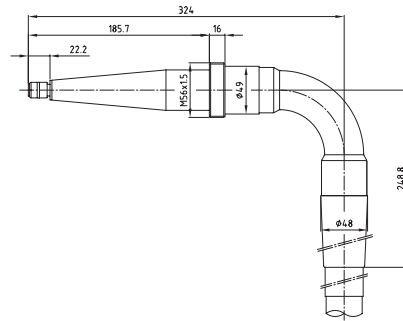
**R24 RA with P3 cable**



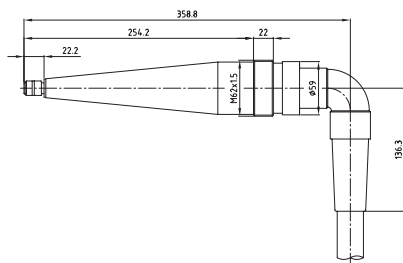
**R28 RA with N3 cable**



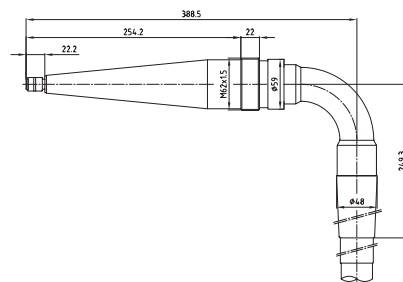
**R28 RA with P3 cable**



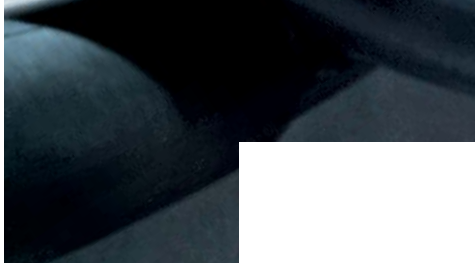
**R30 RA with N3 cable**



**R30 RA with P3 cable**

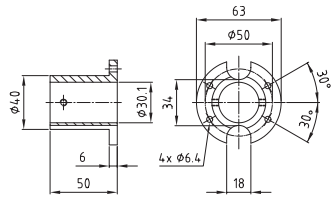




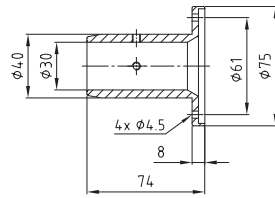


Flanges

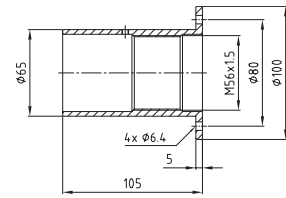
**R10 cable flange** 651142



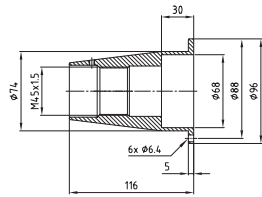
**R10 cable flange** 10001700



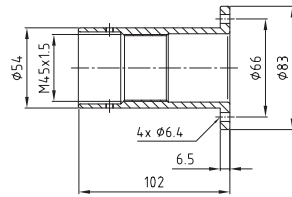
**R28 cable flange** 10001710



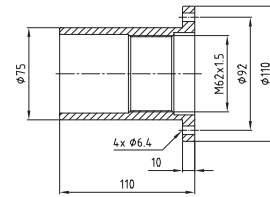
**R24 cable flange** 10001711



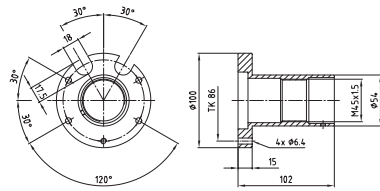
**R24 cable flange** 651136



**R30 cable flange** 651138

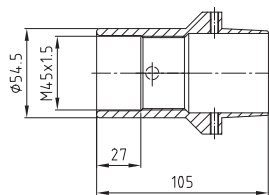


**R24 cable flange** 10001756

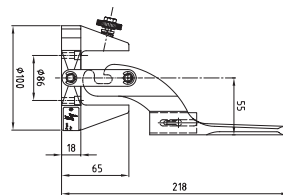


Locking Devices

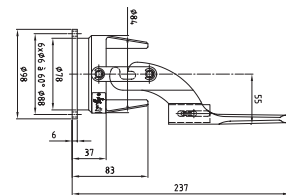
**R24 clamping sleeve** 651053



**R24 locking device** 941002



**R24 locking device** 940303



COMET is a successful technology company in the growth markets security, inspection and microelectronics. As an expert in the field of applied physics, COMET provides a complete and highly flexible offer of components, modules, systems and services from one source.

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.

The X-perts for security, inspection and microelectronics



## DETEK, Inc.

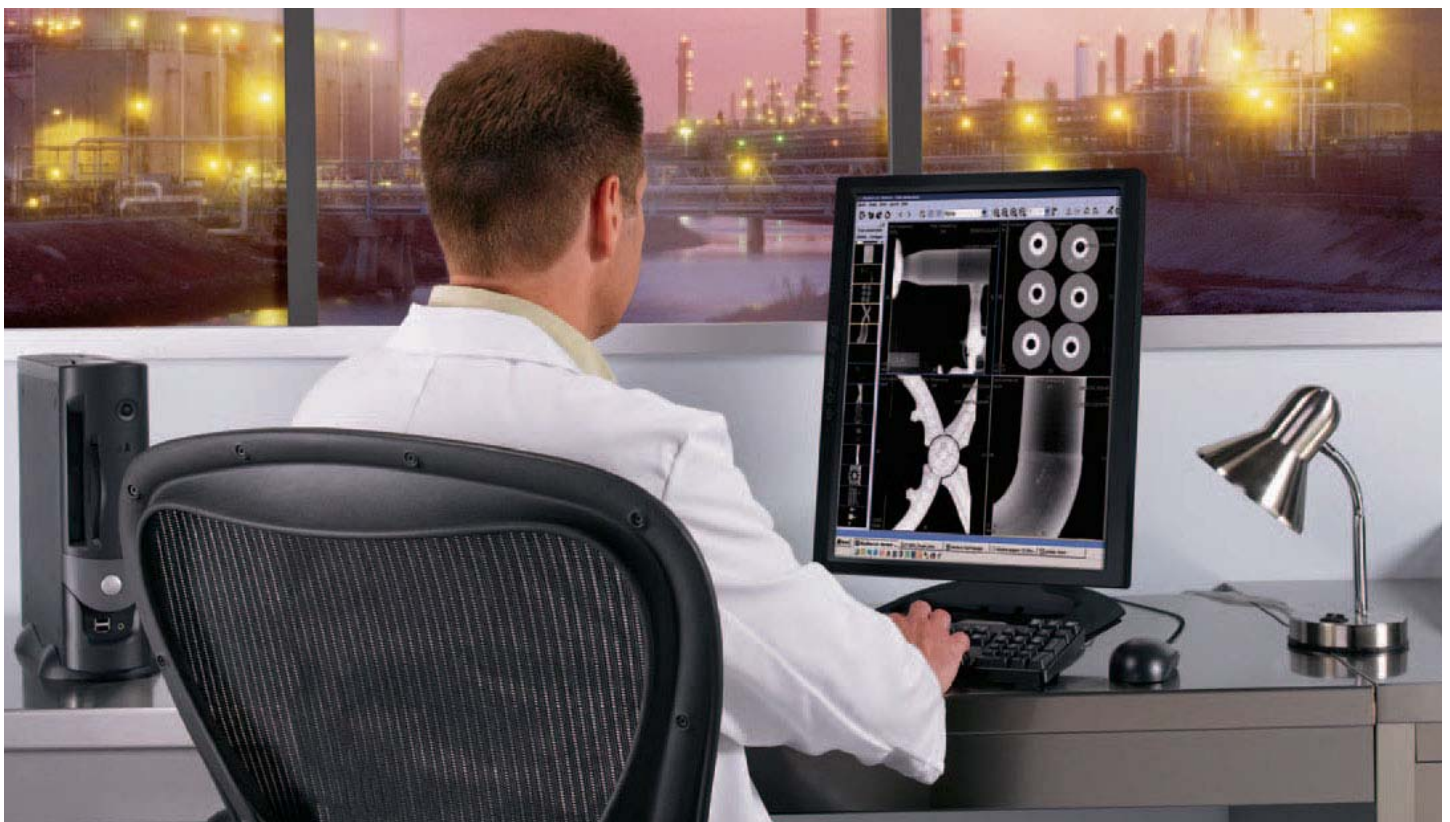
6805 Coolridge Drive  
Temple Hills, MD 20748-6940

800-638-0554    FAX 301-449-7011  
www.detek.com    sales@detek.com

GE  
Inspection Technologies

# Rhythm<sup>®</sup>

Total X-ray Inspection Software



# Rhythm Software—Data Management for X-ray Inspection Information

Acquire  
Analyze  
Share  
Report  
Archive

The Rhythm suite of user-friendly software from GE Inspection Technologies offers advanced image review tools and data management for all X-ray inspection modalities, including computed radiography, digital radiography and film digitization. Its advanced data sharing capabilities allow significant improvements in productivity and enable faster identification of quality problems, leading to reduced production defects or better in-service asset management.

Using industry-standard, non-proprietary data transfer formats, Rhythm provides an elegant and cohesive solution to data management and sharing needs, while creating a stable platform for future NDT software capabilities.

## Enhance the Business Impact of NDT

### Improve efficiency and reproducibility

Advanced image review tools cover all X-ray inspection modalities including computed radiography, digital radiography and film digitization.

### Save time and money

Send information electronically to the inspection experts rather than sending the experts to the information. Share information between workstations, locations and within the supply chain.

### Automate specific inspection tasks

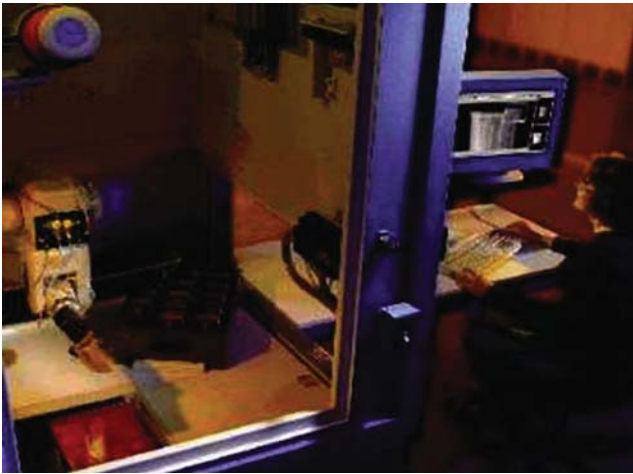
Application-specific tools improve process efficiency.

### Protect your investment

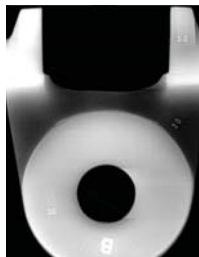
Scalable architecture allows the solution to grow with your needs. DICOM/DICONDE compliance ensures your data will not become obsolete.

### Reduce training requirements

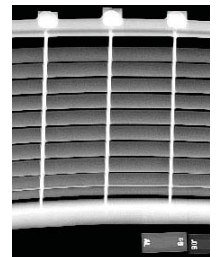
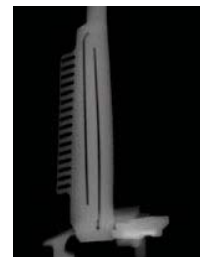
Quickly and easily learn this user-friendly solution.



Automotive



Aerospace



# The Power of Four

The new Rhythm software suite comprises four integrated modules, all of which use off-the-shelf hardware.

## Rhythm Acquire

Interacts with the inspection source to collect digital information that it passes on to Rhythm Review. It contains a database of the relevant inspection techniques and can control the inspection equipment.

## Rhythm Report

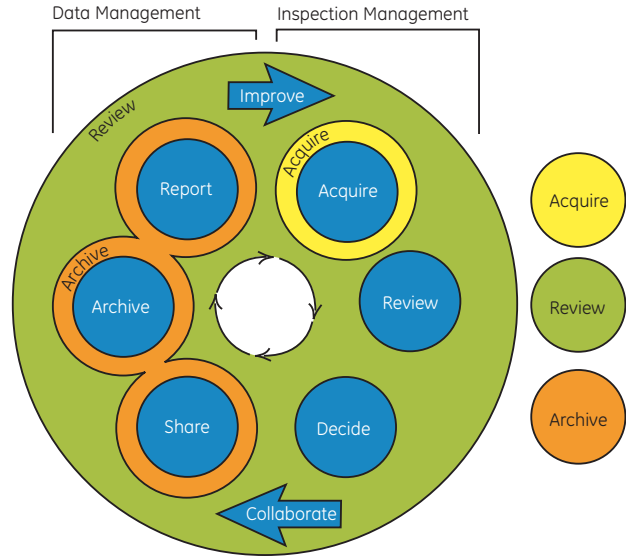
Allows creation of reports of findings with Rhythm with standardized templates or easily configured customized formats. Rhythm Report increases your productivity by allowing you to generate reports right at the inspection site.

## Rhythm Review

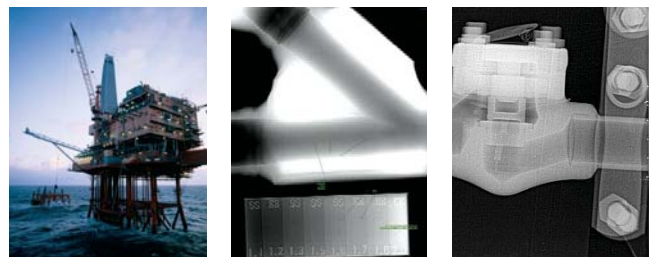
Accepts data from Rhythm Acquire, other Rhythm Review workstations, and removable media, such as CD and DVD. Provides application tools for analysis, enhancement, measurement and storage of received data.

## Rhythm Archive

Provides both on-line and nearline data storage to allow simplified information sharing and faster access to information.



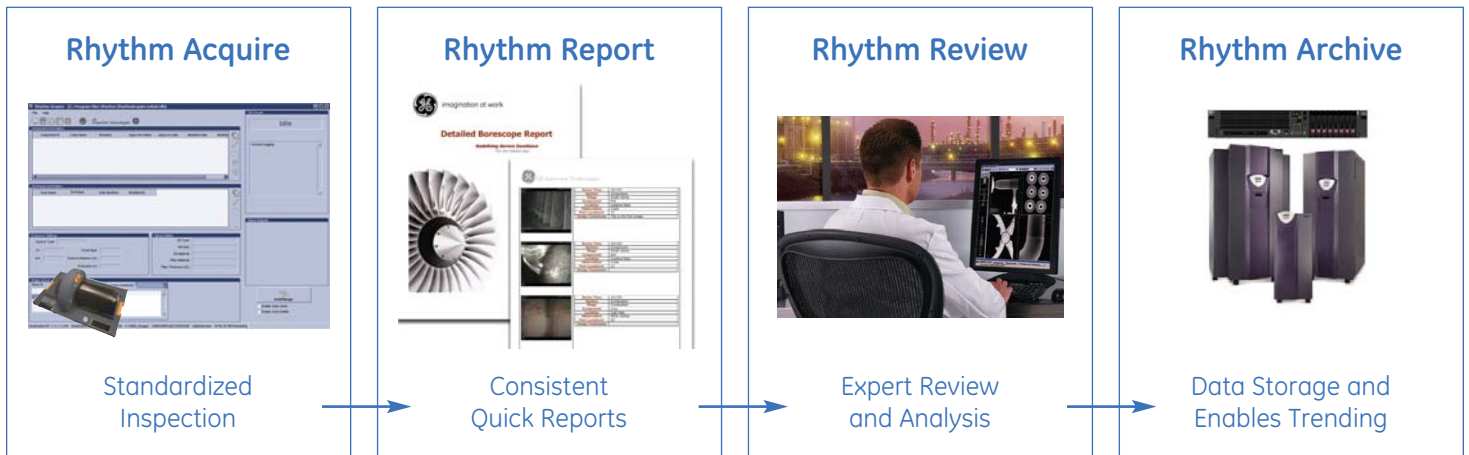
Power Generation



Oil and Gas



# Rhythm Modules



## Rhythm Acquire

**Acquire is a one-time activity (or entered as new parts are inspected or new techniques used).**

- Input the information used to identify inspected parts.
- Input information about radiographic techniques used to inspect each part.
- As parts are inspected and imaging plates are scanned, information is passed along with the image in a DICONDE file to Rhythm Review.
  - The image and information are always together.
  - This information is used to find the image in Rhythm Review or anywhere in your digital imaging network (workstations, shelf-managed archives, central on-line archives).

## Rhythm Report

**Rhythm Report is an automated report generator tool that allows you to create reports of your findings with Rhythm with just a few clicks of a mouse.**

- Leverage Microsoft® Word-based reports that you can send, query on, modify and receive. Reports are treated separately from associated images so that they can be amended and sent independently over a network.
- Create real time reports at the inspection site with pre-formatted templates.
- Generate labels with annotations and measurements that can be viewed or hidden with your study and report.
- Establish reporting profiles to display your report windows in a particular way that helps you manage your reports.

## Rhythm Review

**Rhythm Review uses the data from Rhythm Acquire to automatically organize your inspection information.**

- Sort "Studies" using this data. A "Study" is a unique combination of Component ID, Component Name, and Study ID.
- Field labels are easily customized, like those in Rhythm Acquire.
- Other DICONDE fields, like Study Status and Study Date, help you easily retrieve and manage your data.
- When multiple images are created of the same part, Rhythm organizes the images into one study to simplify retrieval, review and archiving.
- Rhythm allows you to query the DICONDE information for quick retrieval when you have accumulated a large amount of inspection data at your workstation.
- Rhythm allows you to query the DICONDE information to find Studies even after they have been archived to CD/DVD.

## Rhythm Archive

**Rhythm Archive delivers a complete scalable and flexible DICONDE storage solution for NDT images.**

- Provides fast, reliable storage and retrieval of images using Plasmon Ultra Density Optical (UDO) technology.
- Manages various types of storage devices, including both internal and external RAID-based, EMC Centera and NAS interfaced storage.
- Stores uncompressed, lossless, lossy and JPEG2000 formats.
- Sends data to DICOM/DICONDE-ready devices.

With Rhythm Archive, all studies are stored centrally with no need to query individual Rhythm Review workstations. Rhythm Archive manages workflow to automatically route, archive and delete images from local review stations. It also provides full review and analysis capabilities.

# Enhance Rhythm Functionality with Optional Modules

## Rhythm Local Archive

- The Local Archive module allows archiving of component, study and report data on a single removable media from any removable device that has a Windows®-based driver. It is useful for organizations that have “shelf managed” archives or that want to distribute images via removable media.
- Data is written in DICOM/DICONDE format readable by third party systems compliant in that format. Local Archive presents the first step in digital archiving with growth to full DICOM/DICONDE archiving.
- A browser-based viewer allows for exporting of images and reports outside of the network, along with an option for printed reports.



## Quality Control Module

- The Quality Control module is a quality assurance tool for post-processing acquired data. It verifies that images and studies are correct and that they have the right information associated with them before they are shared or permanently stored and provides the capability to modify them.
- The module assesses if component or technique data was entered incorrectly, if images are not in the right order, that DICONDE information is incorrect or missing, or if window level settings during acquisition were not optimal.
- The Quality Control module also provides access to the study status history so that you can determine when components were inspected, by whom, and with what outcome.

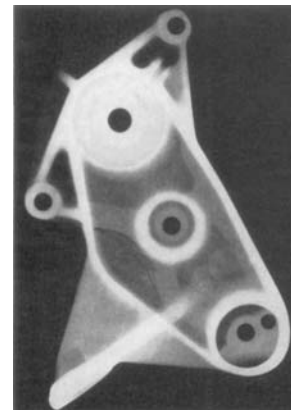


## Rhythm DICOM Print Module

- The DICOM Print module provides a solution for the inevitable need to provide print images from within the digital imaging network. It supports printers from high-end DICOM-compliant ones to off-the-shelf printers with standard Windows® drivers. It supports color and monochrome printers and also allows for multiple printer connections.
- It allows the printing of series or studies in pre-defined film layouts or from your custom layouts. In addition, it offers a “virtual film sheet” that allows you to compose print jobs on the fly from within the Viewing section—rearranging, annotating and post-processing images before sending them to the printer.

## Rhythm Multi-Monitor/Mixed Monitor Module

- Multi-Monitor/Mixed Monitor allows Rhythm to run on more than one monitor, which increases your information display space, as well as configuring Rhythm to run on color and monochrome monitors and monitors with different resolutions.
- View images on high-resolution color monitors and reports and data on lower resolution commercial monitors with a powerful work list that minimizes the need to toggle between images and data.



# The Right Tools for the Job

One of the major factors that allows Rhythm to increase inspection efficiency is its integral range of advanced, application-specific tools.

Rhythm's advanced image review and tools enable the following benefits:

- Save time through quicker image evaluation.
- Improve quality of inspections through advanced review tools.

## Wall Thickness Measurement

- Performs computer-assisted wall thickness measurement to detect local corrosion in projection radiographs by use of tangential or penetration wall measurement tools.
- Saves the measurement results and the exposure parameters.

## Area Measurement and Calculations

- Allows users to select an area around a porosity and automatically calculate the loss of material/area measurement of the defect.

## Multi-film Inspection Tool

- Reproduces the conventional film method of putting two or three different sensitivity films on top of one another and shooting a part, then having different cross-sectional thickness ranges available for analysis.

This tool splits the dynamic range of the selected radiographic image into two or three exclusive partitions for better visualization and analysis of image features.

## Defect and Material Loss Measurement

- Allows users to measure material loss in the X-ray beam direction (similar to the wall thickness penetration measurement), showing material loss instead.

# Protecting Your Future Today

Rhythm doesn't just ensure your NDT needs are met today, but also looks to what you may require in the future.

This is achieved through the scalable architecture intrinsic to the design of the software, DICOM/DICONDE compliance, and GE Inspection Technologies' focus on application-specific tools.

- While Rhythm is currently configured for X-ray inspection management, ultrasonic and eddy current capabilities are planned for the near future.
- As your requirements grow, you can add more review stations, database capacity and DVD jukeboxes to your system. This ensures you will always have the capacity required without the expense of investing in a new solution.
- Because the software is DICOM/DICONDE compliant, you will not face the problems of being locked into propriety solutions where time and expense is wasted on maintaining previous NDT systems.
- GE Inspection Technologies is committed to working closely with you to develop application-specific tools that can be deployed quickly as Rhythm plug-ins.

### Minimum Hardware Specifications

<b>Processor</b>	Intel Core i7 Duo E6700 2.67 4/MB 1066
<b>Operating System</b>	Windows® XP Professional, 32-bit US
<b>Chassis Configuration</b>	Mini-Tower
<b>Memory</b>	4GB (4x1GB) DDR2-667 ECC
<b>Hard Drive</b>	80GB WD Raptor SATA NCQ 10K
<b>2nd Hard Drive</b>	80GB WD Raptor SATA NCQ 10K
<b>DVD</b>	16x DVD± RW SuperMulti SATA (1st)



Plasmon Ultra Density Optical (UDO) data storage



## New Base Features

- ✦ Set Default Window Layout
- ✦ Zoom-to-Area
- ✦ 0.001" Measurement Precision

## Enhanced Features

- ✦ Irregular Region of Interest
- ✦ Free Rotate
- ✦ Split Window Viewing
- ✦ MMX & FPX Scanner Support

# LOGOS 7.0





The Logos Imaging Application (LIA) allows users to capture, edit, save, and share images captured with all Logos Imaging devices and TWAIN compliant devices. Below is a list of standard and enhanced\* features of LIA 7.0.

### **Adjustments**

Auto Correct  
Auto Level

### **Backup and Restore**

Create Backup  
Restore from Backup

### **Filters**

Adaptive Histogram  
Alacrity\*  
Colorize  
Despeckle  
Emboss  
Equalize  
Filter Paramaterization\*  
Invert  
Original Image Restore  
Percept\*  
Sharpen  
Smooth  
Outline  
Weighted Outline\*

### **Image Details**

Cursor Position  
Pixel Value  
Image Width and Height  
Created Date  
Pixel Format  
Image Processing History  
Export Image Script

### **Image Levels**

Histogram  
Expanded View  
Auto Levels  
Brightness  
Contrast  
Gamma

### **Image Management**

Combine Images  
Copy Selection  
E-mail Images  
Export  
Import  
Image Database  
Image Notes  
Image Stitching  
Run Filters in Stitch Window\*

### **Image Rotation**

90 CW  
90 CCW  
180  
Flip Horizontal  
Flip Vertical  
Free Rotate\*

### **Image Viewing**

Pan Control  
Magnifying Glass  
Zoom In  
Zoom Out

Zoom to Area  
Fit to Window  
Grid Overlay  
Show/Hide Markup

### **Languages**

Chinese (Traditional)  
English  
German  
Korean  
Japanese  
Russian

### **Tools**

Line  
Polyline  
Rectangle  
Region of Interest (Rol)  
Irregular Rol\*  
Ellipse  
Text  
Measure (0.001")  
Calibration  
Line Profile

### **Workspace Layout**

Menu Bar  
Tools Palette  
Image Pane  
Incident Manager Pane  
Image Correction Pane  
Set Default Layout  
Split Window Viewing\*

**\*Enhanced features are not included in Logos base software upgrades**



**DETEK, Inc.**

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com



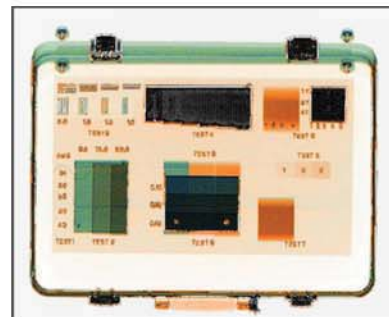


# CHRÓMA

The CHRÓMA for Logos DR systems is an organic discrimination module for use with the Golden Engineering XRS-3 X-ray machine. The CHRÓMA uses X-ray beam filtering to allow dual-energy exposure from the fixed voltage produced by the XRS-3. And, since the CHRÓMA is an add-on accessory that requires no modification to the XRS-3 or Logos DR panels, users can upgrade their existing equipment with no concern regarding down time caused by equipment upgrades.

The CHRÓMA connects to the 5-pin LEMO connector\* on the Golden Engineering XRS-3. This connection provides power to the CHRÓMA and interfaces with the Asýrmatos wireless X-ray firing trigger. When attached to the XRS-3, this enables the CHRÓMA to operate wirelessly with no requirement for an additional power source or an additional X-ray triggering device.

The CHRÓMA is designed to meet the requirements of ASTM F792-08. Under this standard, the CHRÓMA module and Logos DR system must meet compliance by being tested using the new Security X-Ray Test Object developed by the FAA and Transport Canada. This test object assesses performance levels and image quality of X-ray screening systems in nine distinct test areas: Wire Display, Useful Penetrations, Spatial Resolution, Simple Penetration, Thin Organic Imaging, Sensitivity, Organic/Inorganic Differentiation, Organic Differentiation, and Useful Organic Differentiation.



**Sample Image from  
ASTM F792-08 Test Piece**

\*If your Golden XRS-3 does not have a 5-pin connector, Logos Imaging can update the X-ray machine with a membrane switch control and 5-pin connector for a nominal cost.



**DETEK, Inc.**

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com

GE  
Measurement & Control

*Portable, Wireless and Robust.*



## Inspection Technologies Wireless Digital Detectors

Enabling the inspection of field installations to be more flexible and efficient.



GE imagination at work





# DXR250C-W: Engineered for Industrial Radiography

The DXR 250C-W portable detector combines GE's unrivalled wealth of experience and expertise in medical and industrial radiography. This new digital detector is specifically designed to meet the demanding requirements of industrial radiographic inspections.

- Reduced exposure time for increased personal safety.
- Reduced barricade time on units to inspect for optimized process safety.
- Reduced setup time for maximized productivity.

The system set-up, image acquisition and data processing is simplified with powerful Wi-Fi communication modes



Choice of semi- or fully ruggedized notebooks for harsh environment operations. Pre-installed Rhythm software for enhanced analysis capabilities with instant image review

Ruggedized detector with high pixel pitch with optimized image quality, wide dynamic range and dose efficiency



## Compact & Portable

The 8"x8" detector weighs just 3,5 kg (7lb) and has a thickness of only 25 mm (0.98"). Ideal for places which offer difficult access and where utmost portability is needed.



## Wireless

The detector uses wireless and battery-operating technology. Simplifying handling and operation. And leading to overall productivity gain for its users.

- Robust wireless operation (802.11 g, up to 80 m communication range, WEP2 security) with online wireless strength, detector temperature and remaining detector battery power monitoring
- Access Point mode with portable access point for extended range
- Ad-hoc communication for fast image transfer
- Optional power saving mode to increase battery usage

Ruggedized hard-cover for mechanical protection, easy transportation and installation in industrial set-ups



Hot-swappable Li-Ion battery with inbuilt remaining power indicator



Battery charger for fast-charging and battery recalibration

Detector with 8 x 8" GOS scintillator, 200 µm optimized imager design for excellent dynamic range and improved performance with both X-rays and Gamma-rays

## The Power of Rhythm

The new **Rhythm RT DR Acquire** provides additional functionality for portable wireless detectors and allows operators to acquire images in a non-proprietary and reliable DICONDE format.

A new wireless—dashboard for ease of operations and troubleshooting includes tools to determine detector connectivity and to monitor relevant conditions such as wireless signal strength or battery status. New acquisition modes such as synchronized operation for pulsed X-ray sources and increased exposure time per frame to up to 150 sec, enables the detector to expand in new applications.



Together with **Rhythm Review** the entire portfolio of image enhancement-, administration-, reporting- and archive-modules can be accessed on one DICONDE compliant platform (Enterprise Archive, Flash!Filters, Wall Thickness-Measurement, Report Generators, etc. ) and adapted to the individual customer workflow and application needs.

**Rhythm RT Lite:** A special entry-level version of Rhythm that supports simple, intuitive out-of-the-box image acquisition and processing.

Both portable wireless detectors can be used with the full DICONDE compatible Rhythm RT Lite and open up a path to digital inspection in a very economical way.

## Robust

With its industrial packaging and ruggedized design, the DXR250C-W handles the toughest environments.

- Ruggedized design with aluminum housing and shock absorbing panel support (shock, water and dust protected housing) with additional rugged perimeter bumper
- Carbon fiber front window
- Shielded electronics for improved radiation protection
- Optional hard-shell with additional tie-off points and shock bumpers for additional mechanical protection
- Extended operating temperature range
- Industrial power supply with On/Off switch and detachable tether

## Key Segments and Applications

- Mechanical integrity for small, medium and large sized parts
- Wall thickness, corrosion, erosion
- Weld quality
- Pipe and tube quality
- Heat exchangers
- Small and large bore piping
- Pipe supports touch point corrosion
- Rope access in all types of petro-chemical and other industrial environments

## Flexible Operating Modes

- Both detectors can be operated from hot-swappable on-board battery or from the optional power supply
- Wireless configurations with ad-hoc or access point hosted communication

## DXR250U-W: Optimized for a wide range of radiographic inspections

The DXR250U-W builds up on the established application space of GE's portable 16x16" detector series DXR250V. The new detector utilizes the same wireless and battery technology of the DXR250C-W. This extends the use to a versatile digital inspection system especially for medium to larger objects.

Optimized battery, wireless technology and packaged for the toughest environments, the DXR250U-W will deliver additional productivity for radiography inspections in the field. DXR250U-W is fully compatible to most DXR250C-W accessories and Rhythm installations.



## Universal & Portable

Even with a larger imager size of 16"x16" the detector weighs only 5 kg (11 lbs) and has a thickness of only 26 mm (1.02"). The detector can be used for a wide range of radiographic applications covering medium to large sized objects. Extended by its wireless capabilities and the portable design, the detector is qualified as universal inspection device for a broad range of industrial inspections in the field.







## Accessories

		
Ruggedized hard-cover	Semi-ruggedized mobile Rhythm workstation HP 8770W	Ruggedized mobile Rhythm workstation Panasonic Toughbook CF-53
		
Carrying case	Power supply	Battery charger
		
Battery	Portable wireless router / access point	Soft-case*

\* only for DXR250C-W

## Technical Specifications\*

Detector	DXR250C-W	DXR250U-W
Flat Panel Type	Amorphous silicon	
Scintillator Material	Gadolinium oxysulfide (GOS)	
Active Area (approx.)	200 mm x 200 mm	405 mm x 405 mm
Image Format	Full: 1024 x 1024 / Binned: 512 x 512 / center Region of Interest: 512 x 512	Full: 2048 x 2048
Pixel Pitch	200 µm	
A/D Conversion	14 bits	
Min. Exposure Time	130 ms	
Max. Exposure Time	150 sec	
Interface	Gigabit Ethernet (separate line) WIFI 802.11g (adhoc / Access Point)	100 Mbit Ethernet combined with battery plug WIFI 802.11g (adhoc / Access Point)
Dynamic Range	10,000 : 1	
Dimensions	408 mm x 257 mm x 25 mm (16.06" x 10.12" x 0.98") (30 mm in the battery bay area)	600 mm x 460 mm x 26 mm (23.62" x 18.11" x 1.02") (28 mm in the battery bay area)
Weight	3.5 kg (7 lb) (including battery, without hard-shell)	5 kg (11 lb) (including battery, without hard-shell)
Operating Temperature	-20°C to 50°C (reduced dynamic range at higher temperatures in this range)	
Storage Temperature	-40°C to 70°C (-40°F to 158°F)	
Operating Humidity	RH, 10-90% non-condensing	

### Power Supply

Voltage	Input: 100-240 V, 50-60 Hz Output: 12 V DC
Dimensions	105 x 60 x 240 mm (4.13" x 2.36" x 9.45")
Weight	0.7 kg (25.7 ounces)
Tether	Detachable, length 3 m (10 ft)

### Battery Charger

Type	Two bay, level-3, stand alone battery charger compliant with Smart Battery System (SBSBus)
Power Supply	Input 30 V DC, including wide-range power supply
Features	Sequential charging Battery calibration in left bay LED status indicator
Dimensions / Weight	175 x 124 x 58 mm (6.89" x 4.89" x 2.30") 440 g (15.5 ounces)

### Battery

Type	Lithium Ion
Rating	11.1 V, 1.85 Ah, 21 Wh
Features	Charging status indicator

### Portable Wireless Router / Access Point

Type	150 Mbps portable battery / USB powered wireless router
Wireless Features	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n 2.4 - 2.4835 GHz Supports 64/128 bit WEP, WPA-PSK/WPA2-PSK, Wireless MAC Filtering, Enable/Disable, SSID Broadcast
Power Supply	Internal 2000 mAh rechargeable battery, 5 V DC / 1.0 A external power adapter, Micro USB
Dimensions / Weight	100 x 62 x 16 mm (3.9" x 2.4" x 0.6") 94 g (3.3 ounces)

\* Subject to change without further notice



[www.ge-mcs.com](http://www.ge-mcs.com)

GEIT-40056EN (09/13)

# DXR250P

## Direct Radiography

Designed for field use, the DXR250P provides a compact digital radiography solution that is ready to be deployed in some of the most challenging environments. The portability of the DXR250P allows for use in applications that have been previously limited to computed and film radiography. DXR250P enables shorter exposure times and instant image review, reducing the need for re-shooting of images and leading to overall productivity for users.

### Features and Benefits

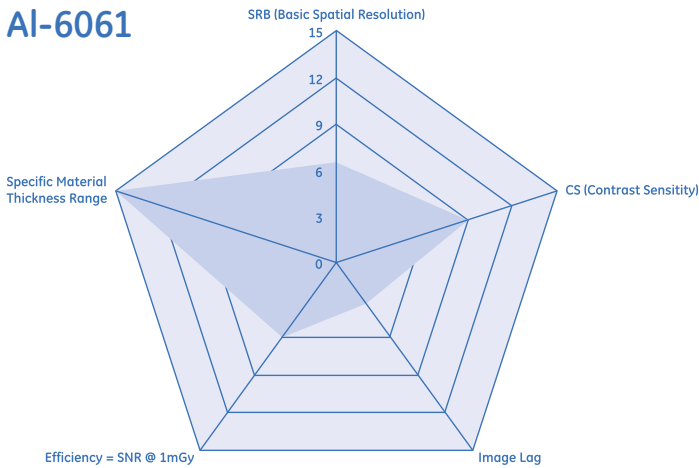
- Highly efficient CsI scintillator requiring minimal dose to produce premium images
- Lightweight, thin packaging allowing for maximum accessibility
- Detachable quick disconnect tether cable for easy set-up
- Ruggedized covering and carrying case for field deployment (optional)

### Applications

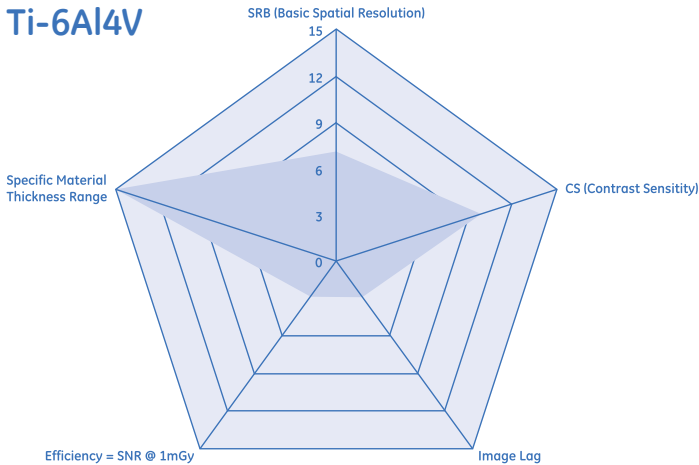
- Erosion corrosion
- Flow assisted corrosion
- On-wing
- Foreign object detection



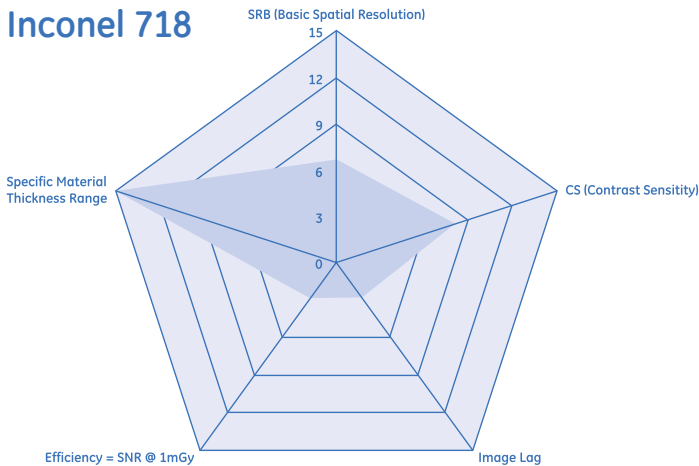
## Al-6061



## Ti-6Al4V



## Inconel 718



## Detector Characterization Charts

The detector characterization charts provided on the left are completed in accordance to ASTM E2507-07 Standard Practice for the Manufacturing Characterization of Digital Detector Arrays. This standard allows for the direct comparison of DDAs by ensuring data is collected and reported in a consistent and specified manner. The standard also enables guidance for the appropriate pairings of detectors with applications.

Pixels are identified as bad per one or more of the seven definitions described in the ASTM E2597-07 document. The pixels marked as bad will be corrected through GE's software utilizing data collected from good neighborhood pixels.

## Technical Specifications

### Detector Specifications

Flat Panel Type	Amorphous Silicon
Scintillator Material	CsI
Active Area (approx.)	410 x 410 mm (16 x 16 in)
Image Format	2048 x 2048
Pixel Pitch	200µm
A/D Conversion	14 bits
Min Exposure Time	130 ms
Interface	Gigabit Ethernet
Dynamic Range	10,000:1
Dimensions	585 x 465 x 27mm
Weight	6 kg (13 lb)
Operating Temperature	10° to 35° C (50° to 95° F)
Operating Humidity	10-90% non-condensing

### Power Supply

Voltage	100-240V, 50-60Hz
UT Output Connector	163 x 287 x 56 mm (6 x 11 x 2 in)
Weight	3 kg (7 lb)



[www.gesensinginspection.com](http://www.gesensinginspection.com)

GEIT-40048EN (01/10)

# DXR250V

## Direct Radiography

Designed for field use, the DXR250V provides a compact digital radiography solution that is ready to be deployed in some of the most challenging environments. The portable DXR250V is an entry-level detector that allows users to apply digital radiography to applications previously limited to computed and film radiography. DXR250V enables shorter exposure times and instant image review, reducing the need for re-shooting of images and leading to overall productivity for users.

### Features and Benefits

- Lightweight, thin packaging allowing for maximum accessibility
- Detachable quick disconnect tether cable for easy set-up
- Ruggedized covering and carrying case for field deployment (optional)

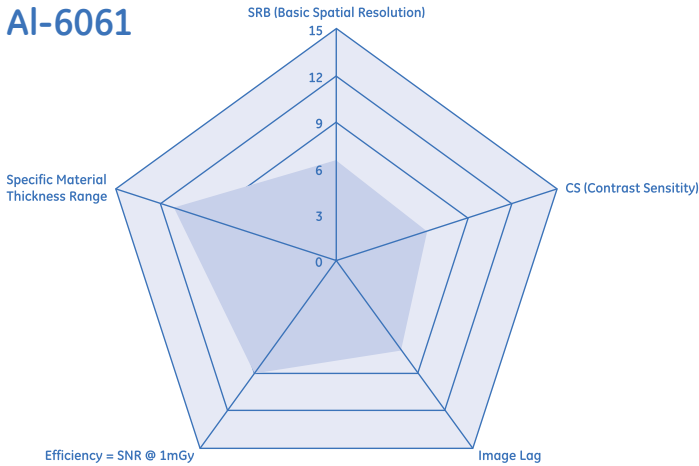
### Applications

- Erosion corrosion
- Flow assisted corrosion
- On-wing
- Foreign object detection

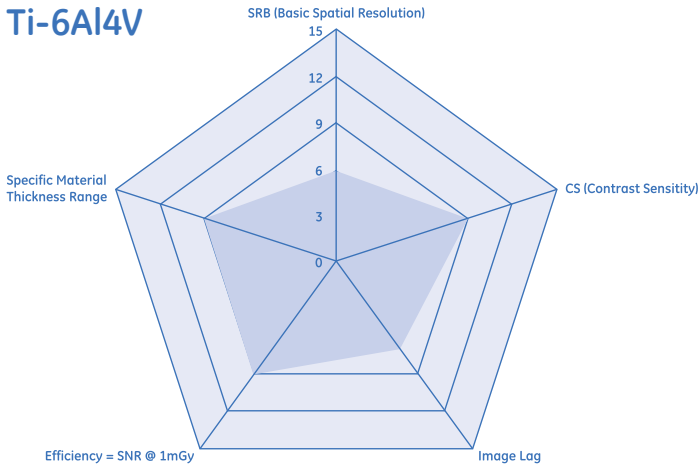




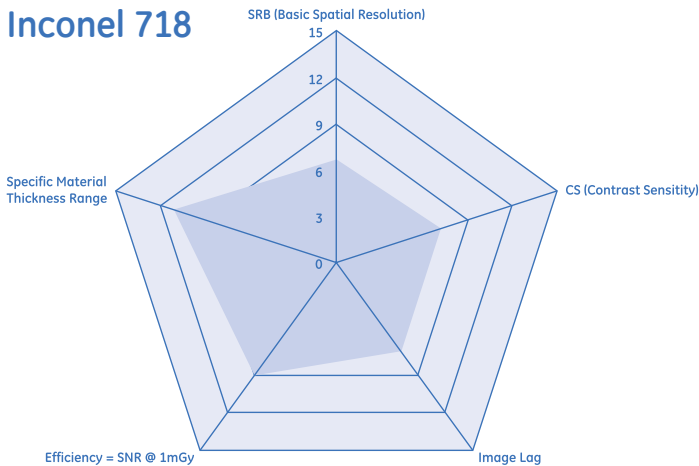
## Al-6061



## Ti-6Al4V



## Inconel 718



## Detector Characterization Charts

The detector characterization charts provided on the left are completed in accordance to ASTM E2597-07 Standard Practice for the Manufacturing Characterization of Digital Detector Arrays. This standard allows for the direct comparison of DDAs by ensuring data is collected and reported in a consistent and specified manner. The standard also enables guidance for the appropriate pairings of detectors with applications.

Pixels are identified as bad per one or more of the seven definitions described in the ASTM E2597-07 document. The pixels marked as bad will be corrected through GE's software utilizing data collected from good neighborhood pixels.

## Technical Specifications

### Detector Specifications

Flat Panel Type	Amorphous Silicon
Scintillator Material	GOS
Active Area (approx.)	410 x 410 mm (16 x 16 in)
Image Formate	2048 x 2048
Pixel Pitch	200µm
A/D Conversion	14 bits
Min Exposure Time	130ms
Interface	Gigabit Ethernet
Dynamic Range	10,000:1
Dimensions	585 x 465 x 27mm
Weight	6 kg (13 lb)
Operating Temperature	10° to 35° C (50° to 95° F)
Operating Humidity	10-90% non-condensing

### Power Supply

Voltage	100-240V, 50-60Hz
UT Output Connector	163 x 287 x 56 mm (6 x 11 x 2 in)
Weight	3 kg (7 lb)



[www.gesensinginspection.com](http://www.gesensinginspection.com)

GEIT-40050EN (03/10)



- ✦ Wired and Wireless Operation Standard
- ✦ Large Imaging Area, 14"x17" (360 x 432 mm)
- ✦ Ultra Thin, 0.6" (15 mm)
- ✦ Easily Attaches to a Tripod with Standard Equipment
- ✦ High Image Resolution, 150  $\mu\text{m}$  Pixel Size
- ✦ Hot-Swappable Batteries

ORAMA  
Οραμα



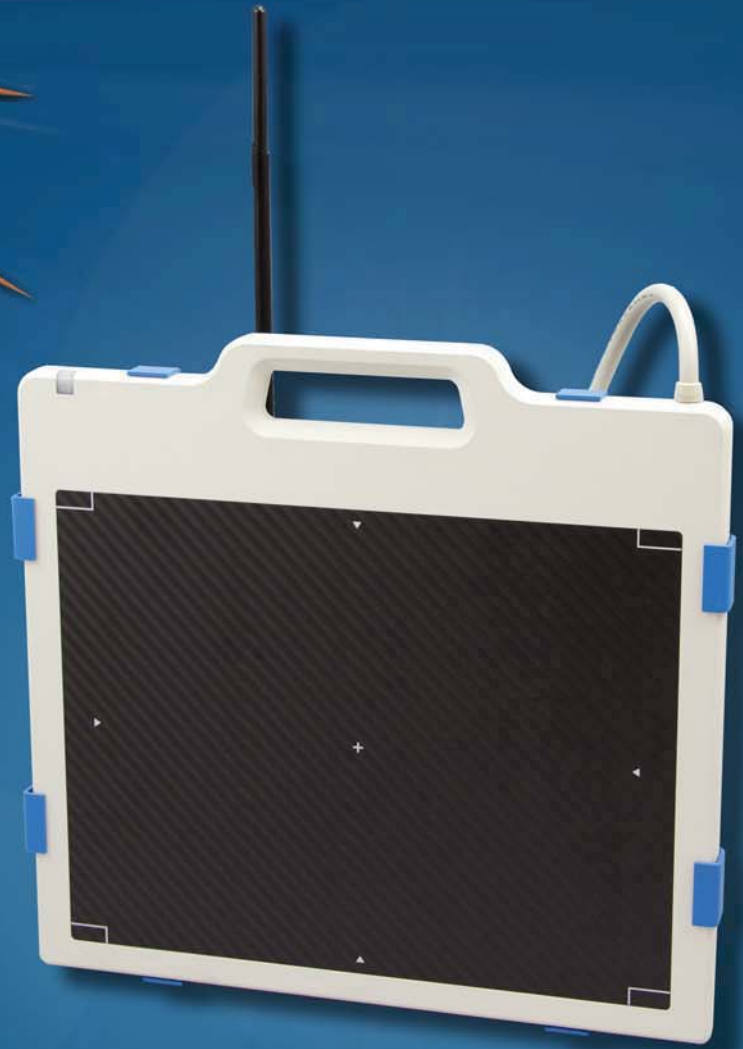
# ORAMA

The ORAMA is a portable digital x-ray flat panel detector that generates high-resolution, high-sensitivity digital images. The complete x-ray imaging system consists of a scintillator directly coupled to an a-Si TFT sensor, an operating PC (available as an option), LIA image acquisition and enhancement software, wireless and wired computer to panel interface, X-ray machine (available as an option), and Pelican carrying case.

Technology	Flat Panel Detector Assembly Csi a-Si TFT- Pin diode
Pixel size	150 um
X-ray sensitive area	360 x 432mm (14" x 17") 2,400 x 2,800 pixels
AD Conversion	14 bits
Grayscale	16,384
Communications interface	Wireless or Wired LAN
Dimensions (W x L x H)	491 x 480 x 15mm 19.3" x 18.9" x 0.6"
Weight	3.8 kg 8.4 lbs
Power	100-240 VAC (50-60 Hz) using included power supply 18.5 V, 5,200 mAh, Li-Ion hot-swappable battery pack 18.5 V, 2,600 mAh, Li-Ion internal backup battery
Operation Environment	+10 to +40° C 30 to 75% RH (Non-Condensing)
PC Requirement	At least Intel Pentium IV HT with 2.8GHz, Intel Core Duo / Core 2 or comparable AMD Dual Core processor At least 2 GB RAM At least 40 GB hard disk Windows XP Professional or higher Ethernet Adapter



**DETEK, Inc.**  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
**800-638-0554**    **FAX 301-449-7011**  
www.detek.com    sales@detek.com



- ✦ Wired and Wireless Operation Standard
- ✦ Easily Attaches to a Tripod with Standard Equipment
- ✦ High Image Resolution, 127  $\mu\text{m}$  Pixel Size
- ✦ Hot-Swappable Batteries
- ✦ Compatible with All 5 Pin Golden Engineering Sources
- ✦ Logos Software Platform

# NEOS



# NEOS

Logos Imaging's NEOS portable, Direct Radiography (DR) imaging system is a lightweight, man or robot deployable, EOD/IEDD solution. With its superb image resolution, wide image format, and fast image acquisition, the NEOS system is an ideal, cost-effective digital x-ray tool for your everyday imaging needs.

Weighing less than 15 pounds with the tripod mount, hot-swappable battery, and interface, the NEOS can be deployed by one person in less than five minutes. Once deployed, the NEOS hot-swappable battery system allows users to operate the system all day with no down time even when 100/220v power isn't available.

Already have a Logos Digital Imaging System? NEOS utilizes the same Logos Imaging software, version 6 and above, that you are currently using. No need to have two laptops: one software platform, two different imaging solutions.

The complete NEOS system, including the optional computer and Golden Engineering XR200 or XRS-3 x-ray machine, fits in one carrying case.

The NEOS system includes full wired and wireless capabilities. Wireless communication between the imager and the computer, as well as wireless firing for Golden Engineering X-ray machines is included in the base NEOS system. There is no need to buy additional wireless accessories.



Shown with interface attached. Interface quickly disconnects from panel reducing thickness to approximately one inch.





# NEOS

## Specifications

Technology  
Pixel size  
Pixel area (active)  
  
Pixel matrix  
AD Conversion  
Grayscale  
Dynamic Range  
Communications interface

Amorphous Silicon, Csl: TI  
127  $\mu$ m  
264 x 325 mm  
10.4" x 12.8"  
2,080 x 2,560 pixels  
14 bits  
16,384  
>73 dB  
Wireless or Wired LAN



Power

100-240 VAC (50-60 Hz) using included power supply  
18.5 V, 5,200 mAh, Li-Ion hot-swappable battery pack  
18.5 V, 2,600 mAh, Li-Ion internal backup battery

Dimensions (W x L x H)

403 x 422 x 22 mm  
15.9" x 16.6" x 0.9"

Weight (panel only)

3.5 kg  
7.7 lbs

Weight (panel & interface)

6.6 kg  
14.5 lbs

PC Requirement

At least Intel Pentium IV HT with 2.8GHz, Intel Core Duo /  
Core 2 or comparable AMD Dual Core processor  
At least 2 GB RAM  
At least 40 GB hard disk  
Windows XP Professional or higher  
Ethernet Adapter



**DETEK, Inc.**

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

**800-638-0554**    **FAX 301-449-7011**  
www.detek.com    sales@detek.com



- ✦ Quick Release Panel Mount, Single Approach Delivery of All Equipment
- ✦ Full Wireless, No Additional Equipment Required
- ✦ Controls and Powers the NEOS and ORAMA DR Systems
- ✦ Hot-Swappable Batteries Allow All Day Use
- ✦ Battery Fuel Gauge So You Know the Charge Status

# ΑΣΥΡΜΑΤΟΣ



# ΑΣΥΡΜΑΤΟΣ

The Asýrmatos interface is a three part system that controls and provides power to Logos DR panels. The standard interface system allows users to operate the NEOS and ORAMA in full wireless or wired modes. In wireless mode, the hot-swappable battery provides the interface with day-long operation and a wireless communication range of over 300 yards even when the radio is set in short-range mode.\*

The wireless x-ray firing module connects to any Golden Engineering x-ray machine fitted with a 5-pin LEMO connector\*\* to allow full wireless x-ray control from within the Logos Imaging Application. The module receives power from the Golden machine and does not require batteries of its own.

The PC-side interface connects to the notebook computer and wirelessly transfers commands between the PC and the DR panel. In wired operation mode, the computer interface is not required.

The panel-side interface connects to the DR panel and wirelessly transfers commands between the DR panel and the PC-side interface. In wired operation mode, the panel-side interface connects directly to an Ethernet port on the PC using the network cable included with the system.

\*If your applications require extended range wireless communication, Logos can configure the system's existing wireless radios to meet your requirements at no additional cost.

\*\*If your Golden XR200 or XRS-3 does not have a 5-pin connector, Logos can update the X-ray machine with a membrane switch control and 5-pin connector.



Shown with interface attached. Interface quickly disconnects from panel reducing thickness to approximately one inch.



# ΑΣΥΡΜΑΤΟΣ

## Specifications

### PC-Side

Communications Interface	Wireless or Wired LAN
Dimensions	159 x 165 x 54 mm (6.3" x 6.5" x 2.1")
Weight	1.0 kg (2.3 lbs)
Antenna	2.4 GHz 9 dBi Rubber Duck (N-Type Female Connector)
Wireless Data	802.11, 2412-2462 MHz
Wireless Data Approvals	FCC, IC, CE
Power	100-240 VAC (50-60 Hz), 3A using included power supply 18.5 V, 2,600 mAh, Li-Ion internal backup battery
Battery Endurance	Eight hours continuous operation (1,000+ image acquisitions)

### Panel-Side

Communications Interface	Wireless or Wired LAN
Dimensions (with ext battery)	177 x 248 x 99 mm (6.95" x 9.75" x 3.91")
Weight (with ext battery )	3.1 kg (6.8 lbs)
Antenna	2.4 GHz 9 dBi Rubber Duck (N-Type Female Connector)
Wireless Data	802.11, 2412-2462 MHz
Wireless Data Approvals	FCC, IC, CE
Wireless X-ray	IEEE 802.15.4, 2.4 GHz
Wireless X-ray Approvals	FCC, IC, CE
Power	100-240 VAC (50-60 Hz), 3A using included power supply 18.5 V, 5.200 mAh, Li-Ion hot-swappable battery pack 18.5 V, 2,600 mAh, Li-Ion internal backup battery
Battery Endurance	
External Battery	Four hours continuous operation (500+ image acquisitions)
Internal Battery	Two hours continuous operation (250+ image acquisitions)

### X-Ray Firing Module

Dimensions	98 x 64 x 34 mm (3.9" x 2.5" x 1.4")
Wireless X-ray	IEEE 802.15.4, 2.4 GHz
Wireless X-ray Approvals	FCC, IC, CE
Power	5V from Golden X-ray machine



**DETEK, Inc.**

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

**800-638-0554    FAX 301-449-7011**  
www.detek.com    sales@detek.com



# ΑΣΥΡΜΑΤΟΣ

## Specifications

(continued)

### Battery Charger

Dimensions 158 x 86 x 52 mm (6.22" x 3.39" x 2.05")

Weight 900 g (1.9 lbs)

### Input

Voltage

Minimum 100 Vrms

Normal 115/230 Vrms

Maximum 240 Vrms

Frequency 47-63Hz

Current 3.15A (Max)

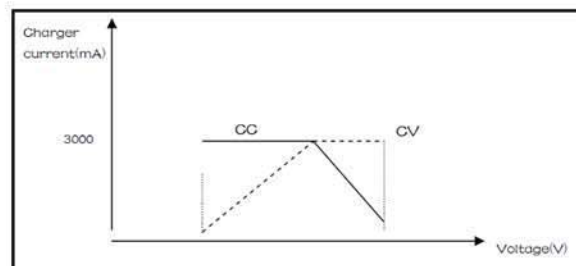
Inrush current 115V/40A (max.), 230V/80A (max.) at 25C at cold start

Power efficiency 80% (min.) at full load, 110Vac or 230Vac 50Hz

### Output

Charge curve

( CC @3A, CV@ 21 +/- 1%V )



Output voltage 21 +/- 1%V at standby

Environment

Ambient operation temp 0C to +40C

Ambient operation RH 20% to 85%

Ambient storage temp -40C to +70C

Ambient storage RH 10% to 95%



DETEK, Inc.

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

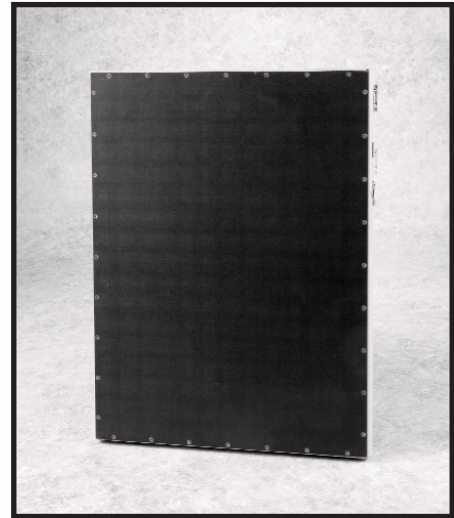
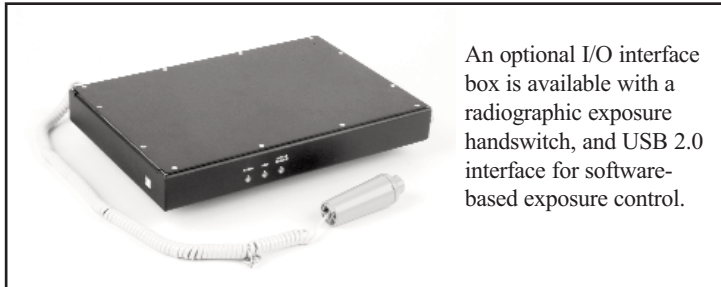
800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com





**Product Description**

The PaxScan® 4030E is a digital X-ray imaging system designed for high-speed radiographic imaging in the field. Based upon the new Gigabit Ethernet interface, images are displayed instantaneously on a user-supplied PC running Varian ViVA™ application software.

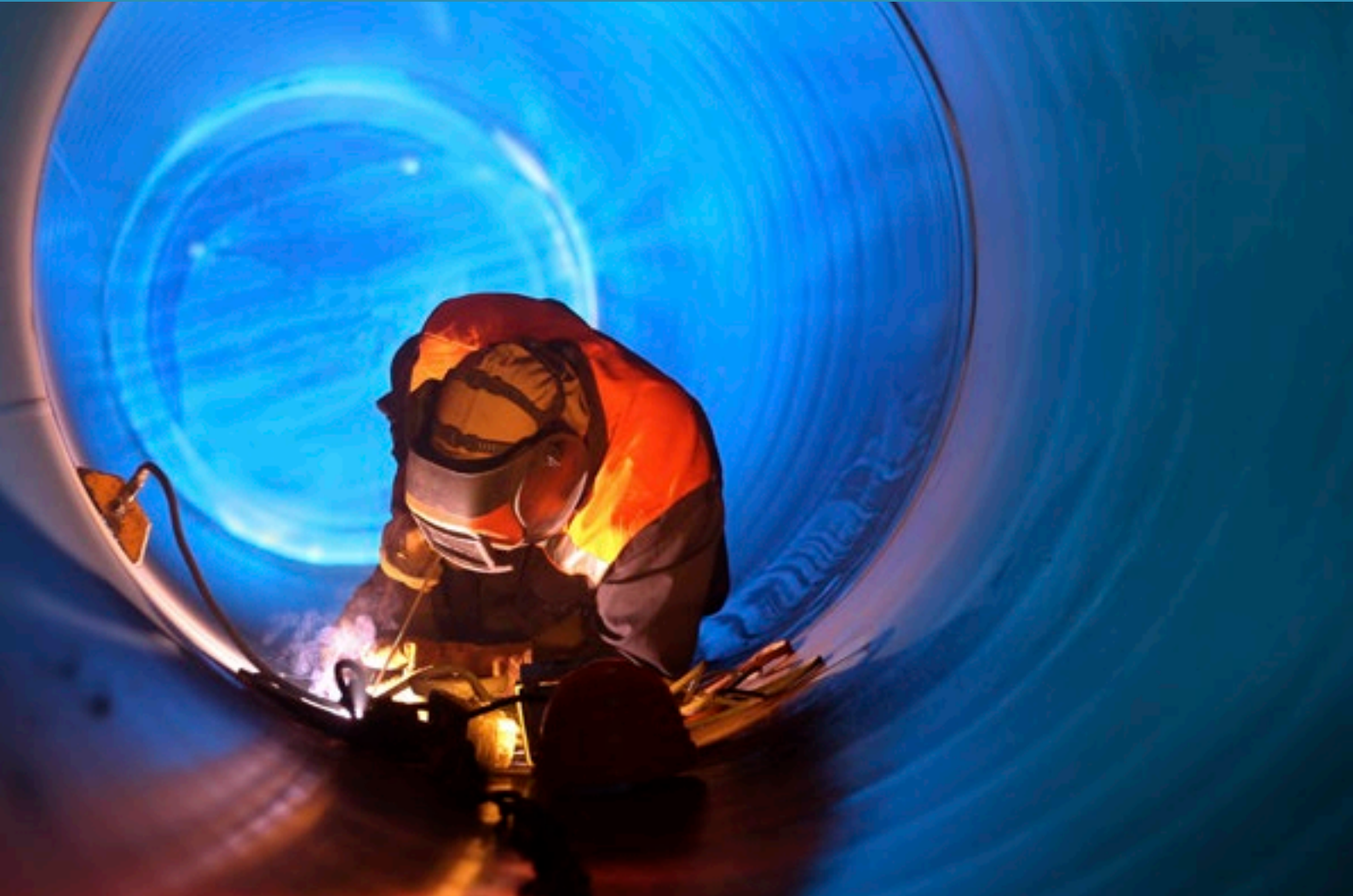


**Technical Specifications**

Receptor Type .....	Amorphous Silicon	<b>Software</b>	Varian ViVA™ application software for image correction, viewing, image mosaic, and calibration. Includes file type translators for .viv, .raw, .jpg, and .bmp file formats. Windows® XP compatible.
Conversion Screen .....	DRZ Plus	<b>Environmental</b>	Temperature Range - Operating .....
Pixel Area	Total .....	29.3 x 40.6 cm (11.5 in. x 16.0 in)	10°C to 35°C (max.)
	Active .....	29.1 x 40.5 cm (11.5 in. x 16.0 in)	(Ambient) - Storage .....
Pixel Matrix	Total .....	2,304 (h) x 3,200 (v)	Humidity .....
	Active .....	2,304 (h) x 3,200 (v)	10 to 90%
Pixel Pitch .....	127 µm	Storage (non-condensing) .....	10 to 90%
Limiting Resolution .....	3.94 lp/mm	<b>Regulatory</b>	
DQE (with DRZ Plus) .....	> 30%	U.S. ....	UL60601-1
MTF, X-Ray (with DRZ Plus) .....	>45% (1 lp/mm)	Canada .....	CSA 22.2 No.601.1-M90
Energy Range .....	40 - 150 kVp	<b>Mechanical</b>	
Fill Factor .....	57%	Size .....	45.0 x 33.7 x 3.4 cm
Contrast Ratio .....	Large Area (12 cm): <2%		(17.7 x 13.3 x 1.3 in.)
	Small Area (1 cm): <10%	Weight .....	12.3 kg (27 lb.) approx.
Scan Method .....	Progressive	Housing Material .....	Aluminum
A/D Conversion .....	14-bits	Sensor Protection Material	Carbon fiber plate (2.5 mm thick) and aluminum
Frame Rate .....	1 fps (1 x 1)	<b>Power</b>	
Data Output .....	Gigabit Ethernet	Power Dissipation .....	35 Watts
		Power Supply/Adaptor .....	100 - 240 VAC, 47 - 63 Hz

GE  
Measurement & Control

# *High Resolution Weld Inspection and All-Purpose Computed Radiography Scanner*



Inspection Technologies:

## CRxVision

Packed with innovative features to increase throughput, extend plate life and provide excellent image quality, the CRxVision is designed specifically for the inspection of welds. The scanner is developed to cover the stringent ISO 17636-2 Class A and B requirements, as well as ASTM, ASME and EN weld standards. Because of its versatility, it can also be used for many other applications across the NDT industry.



GE imagination at work



# CRxVision: the versatile, new tabletop scanner from GE.

## Flexible

accepting a wide range of sizes, shapes and classes of imaging plates

## Intuitive

no gain setting or photomultiplier adjustments required when exposing various thicknesses

## Fast

multiple plate scanning option: side-by-side and back-to-back with a flat transport path

## High Resolution

new laser optics for profound reading and higher data extraction

## Extended Plate Life

no mechanical handling of the imaging plate during scanning and erasing



**6** ASTM DICONDE Compliant fully compatible with GE's existing Rhythm Software Platform

**7** Ambient Operation cover protects the imaging plate from light exposure

**8** Direct Laser Contact the laser beam is in direct contact with the imaging plate (no glass to obscure data collection)

## Your Benefits:

— Compliant to ISO 17636-2 Class A and B, ASME, ASTM and EN weld inspection standards.

— The CRxVision has an **extremely wide latitude** eliminating the need for multiple gain settings when exposing over a wide range of thicknesses. This is the result of a 16 bit image processing at selectable **35 or 70 microns resolution**.

— **Exposure times** for welds are equal or better than existing film exposure times (to comply with Code Standards like EN and ASME) and can be reduced by up to ten times for non-code type applications like erosion/corrosion or valve placement.

— Designed for extremely **high throughput**: 90 plates/hr at 70 microns or 28 plates/hr at 35 microns for a 10 x 40 cm (4.5 x 17") plate. The scanner allows multiple imaging plates to be scanned simultaneously ... side-by-side and back-to-back as well as various lengths to be scanned together. This is a result of the straight and flat, in-line scan and erase transport path.

— Ability to scan **any shape or size of imaging plate** from from 20 to 1500 mm (0.75 to 60") in length. Imaging plates can be exposed in any type of cassette, then simply removed and inserted directly into the scanner without the need of any type of adapter, template or leader.

— A new **innovative imaging plate design** now provides the GE CRxVision imaging plates with more flexibility. This new design allows each imaging plate the ability to return to a flat state after being constantly bent around pipes for the inspection of welds. This feature also helps **improve productivity** by allowing the imaging plates to be easily extracted and reinserted into cassettes.

— Plate transport through the scanners is achieved by a **magnetic transportation system**. This new combination of scanner and imaging plate design allows the imaging plate to be transported through the scanner without any mechanical

handling of the phosphor ultimately extending the overall life of the plate.

— The updated Rhythm RT software simplifies inspection workflow. It now has the ability to **automatically crop the images** by detecting the physical edges of each individual plate when they are processed. Consequently, each individual plate can be separately identified and saved or grouped together and saved as one file.

— The new scanner enjoys all the functionality offered by GE's Rhythm Software giving the inspector the ability to view, enhance, measure, annotate and comment on the images. The CRxVision

system is completely **DICONDE compliant** and compatible with all existing modules in GE's Rhythm Software platform.

— The CRxVision can be used in **ambient light conditions** with suitable handling as the light cover protects the plates from light exposure during the scan cycle. The cover can be removed for work in darkrooms if required.

— The scanner weighs **less than 45 kg** (99 lbs) and has a footprint of 560 x 560 mm (22 x 22 inches). It extends to 560 x 1280 mm (22 x 50 inches) when the feed and exit tables are attached.

— The light guide can be easily cleaned with an internal brush which is operated by simply turning a set screw. The eraser section of the scanner is **completely sealed** from the optics section to prevent migration of any dust particles into the machine.



## Applications

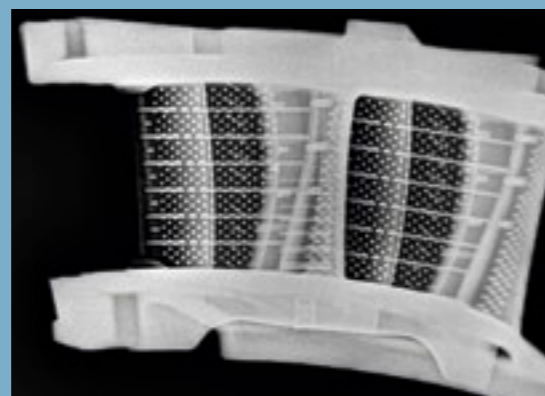
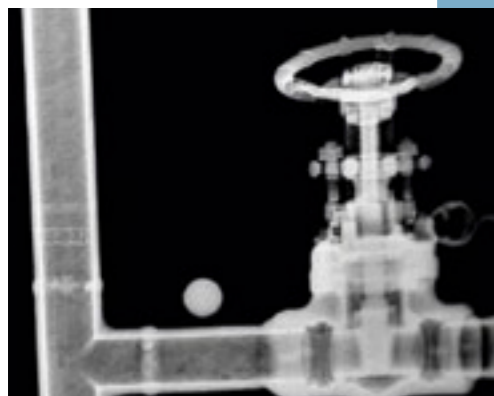
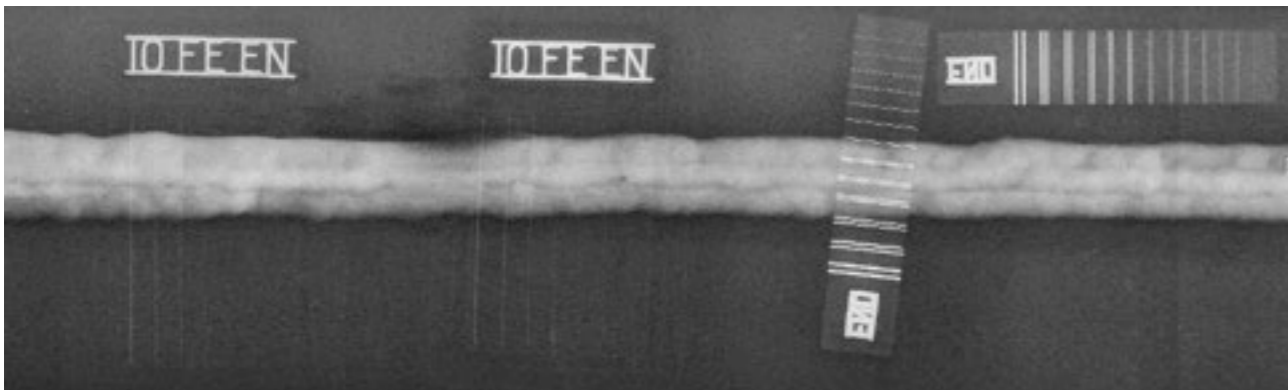
Even though the CRxVision was designed for the inspection of welds, it also has the ability to cover a wide range of industrial radiography applications, from Oil & Gas to Aerospace, and from Power Generation to General NDT.

- Weld inspection
- Erosion/Corrosion inspection (CUI, FAC, etc.)
- Castings (In-process and final)
- Valve positioning
- Concrete and Structure inspection
- Government (Arsenals, National Laboratories, Proving Grounds)
- Military (in-service aircraft, ships, etc.)



In all applications the CRxVision offers the following significant benefits of digital radiography:

- No darkroom facilities/trucks needed
- Eliminate processing chemicals and chemical disposal/silver recovery
- Improved image interpretation and inspection quality level with Flash!Filters™
- Consistent & operator-independent results with the Automated WT Measurement tool
- High reduction in retakes due to the wide dynamic range of the imaging plates
- No development time, as images are immediately available after scanning
- High reduction in storage space when archiving digital images
- Data management (trending) and data sharing advantages
- Fully DICOM compliant



## Rhythm RT for Workflow Optimization

Both GE's Rhythm RT and Rhythm RT Lite provide a powerful, ASTM DICOM Compliant operational software platform, which simplifies the overall inspection workflow.

After entering the component and technique data, select the required scan resolution and then the scanner will prompt you to insert the imaging plate. Once the imaging plate is scanned, the image will appear and any Region of Interest (ROI) may then be

identified on the computer screen and enhancements, annotations and measurements applied. The image can then be saved for further review and/or storage. The files can be saved in TIFF, BMP, JPEG, and/or DICOM formats.

### Rhythm RT workflow

- 1 Select the required resolution
- 2 Enter the component and technique information
- 3 Insert the imaging plate(s) to start the cycle
- 4 Press scan
- 5 Select a specific ROI (if desired)
- 6 Send image to review



## Imaging Plates

Four different types of imaging plates with a ferromagnetic back layer have been developed specifically for the CRxVision. This allows the imaging plates to be magnetically transported through the scanner with no phosphor touch points. In addition, this new design helps reduce backscatter which improves the overall quality of the image as well as allows the imaging plate the ability to return to a flat position after being constantly bent around curved objects.

GE's four imaging plate types are as follows:

- **IPC2:** Standard Resolution & High Speed - for general purpose
- **IPS:** High Resolution & Medium Speed - for inspection of welds
- **IPS2:** High Resolution & Medium Speed - for inspection of welds  
Excellent for very low contrast, homogeneity type applications and premium weld quality inspections.
- **IPU:** Extreme High Resolution & Slow Speed - for extremely high resolution applications when very low micron range sensitivity is required.

Plates are available in various size formats ranging from 70 mm (2.76") wide to 1500 mm (60") in length.

## Protective Cassettes

A range of flexible and hard cassettes are also available. Both versions may be supplied with or without lead, depending on the application.



## Technical Specifications of CRxVision

Functional Data		
Principle	High performance table-top flatbed scanner with contactless plate transport	
Eraser	Inline	
Resolution	Standard resolution (SR)	70 µm
	High resolution (HR)	35 µm
Maximum basic	Standard resolution (SR)	80 µm (6,25 LP / mm)
	High resolution (HR)	40 µm (12,5 LP / mm)
Spatial resolution	High resolution (HR)	40 µm (12,5 LP / mm)
Scan width	35 cm (14 inch)	
Throughput (10 x 40 cm 4.5 x 17")	Standard resolution (SR)	90 plates/hour
	High resolution (HR)	28 plates/hour
Time to image (in Rhythm RT)	Standard resolution (SR)	40 sec
	High resolution (HR)	147 sec
LUT (look up table)	Linear (native Square root)	
Bit depth	16 Bit	
Dimensions	Scanner	56 x 56 x 47 cm (22" x 22" x 19")
	Scanner including I/O table and light cover	128 x 56 x 47 cm (52" x 22" x 19")
Weight	Scanner	45 kg (99 lbs)
	Scanner including I/O table and light cover	50 kg (110 lbs)
Interfaces	Ethernet, RJ45	
	DC voltage, coded 8-pin, female	
Certifications	CE, UL (NRTLus), cUL (cNRTLus), C-Tick, Customs Union Mark	

Environmental Conditions		
Operation	Temp. allowed	15 °C to 35 °C (59 °F to 95 °F)
	Relative humidity	15% to 80% (non condensed)
	Magnetic field	Compliant with EN 61000-4-8, Level 2
Transport	IEC 721-3-2 (1997): class 2K2 and 2M3, with following restrictions	
	Temperature	-25 °C to +55 °C (-13 °F to 131 °F)
	Vibration	5 to 200 Hz (vertical, longitudinal, transversal axis)
Mechanical conditions for transport	In packaging	IEC 721-3-2 (1997): class 2M2
Shock specifications	In packaging	IEC TR 60721-4-5 (1997): class 5M2

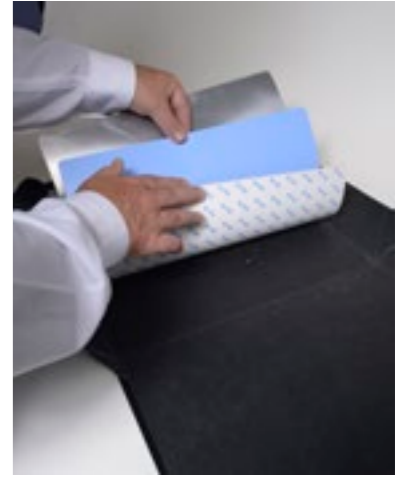
Electrical Data		
Operating voltage	Auto-ranging external power supply from 100 V to 240 V, DC Output 24V	
Mains frequency	50/60 Hz	
Mains fuse protection	Europe	min. 10 A, max. 16 A
	USA & Japan	min. 10 A, max. 15 A
Power consumption	Standby 110 V - 240 V / 50-60 Hz	max. 22 W
	During operation 110 V - 240 V / 50-60 Hz	max. 140 W (absolute peak)

Application Compliance		
ASME	ASME Code Section V Article 2	
ISO 17636-2	Class A / Class B (in defined exposure conditions)	Verified with X-ray, Ir-192, Se-75, Co-60
EN14784-1	IPS, IPS-2: 1/80, IPU: 1/40	Certified by BAM
EN2446-06	IPS, IPS-2: S/80, IPU: S/40	Certified by BAM

Accessories		
I/O Table with light cover	Quick mountable, stainless steel, input/output table set with 43 cm (17") tray length and light cover for input side	
Long I/O table	Input/output extension for long plates scanning 150 cm (59")	
Flight Case	Robust Flight Case with shock-absorbers, wheel, ruggedized handles and compartments for I/O tables, laptop, accessories	

Imaging Plates		
IPC2	High speed plate	Use: CRxVision can scan any shape or size imaging plate from 20 to 1500 mm (0.75 to 60") in length.
IPS	High resolution	
IPS2	High resolution	
IPU	Extremely high resolution (X-ray)	

Cassettes		
Flexible cassettes	PVC or vinyl envelopes	different sizes
Hard cassettes (for defined exposure conditions)	35 x 43 cm, 20 x 24 cm, 24 x 30 cm, 15 x 30 cm, 14" x 17", 8" x 10", 10" x 12", 6" x 12"	



# Regional Offices

## Europe

### Germany

Niels-Bohr-Str. 7  
31515 Wunstorf  
P.O. Box 6241  
31510 Wunstorf  
+49 5031 172 0

Bogenstr. 41  
22926 Ahrensburg  
+49 4102 807 117

### Belgium

Roderveldlaan 5  
2600 Berchem  
+32 3 456 2820

### United Kingdom

Fir Tree Lane  
Groby LE6 0FH  
+44 845 601 5771

### France

68, Chemin des Ormeaux  
Limonest 69760  
+33 47 217 9216

### Spain

San Maximo, 31, Planta 4A, Nave 6  
Madrid 28041  
+34 915 500 59 90

## Americas

### United States

50 Industrial Park Road  
Lewistown, PA 17044  
+1 866 243 2638 (toll free)  
+1 717 242 0327

201 Beltway Green  
Pasadena, Texas 77503  
+1 855 232 7470

### Brazil

Av. Maria Coelho Aguiar, 215  
Building C, 6th floor  
Jd. Sao Luiz - Sao Paulo - SP  
CEP 05804-900 – Brazil  
+55 11 3614-1840

## Asia

### China

5F, Building 1, No.1 Huatuo Road,  
Zhangjiang High-Tech Park,  
Shanghai 201203  
+86 800 915 9966 (toll-free)  
+86 (0) 21-3877 7888

Unit 1602, 16/F Sing Pao Building  
101 King's Road  
North Point  
Hong Kong  
+852 2877 0801

### Japan

Harumi Island Triton Square Office Tower X  
1-8-10, Harumi, Chuo-ku, Tokyo 104-6023  
Tel: +81 3 6890 4567  
Fax: +81 3 6864 1738

GE has sales and service offices all over the world.

Below are some of our locations. Visit [www.ge-mcs.com](http://www.ge-mcs.com) for a complete listing.

- Alzenau, Germany
- Burford, United Kingdom
- Moscow, Russia
- Bucharest, Romania
- Prague, Czech Republic
- Stockholm, Sweden
- Milan, Italy
- East Perth, Australia
- Singapore
- Dubai, UAE
- Buenos Aires, Argentina
- Mexico City, Mexico
- Airdrie, Alberta, Canada
- Toronto, Ontario, Canada
- Montreal, Quebec, Canada



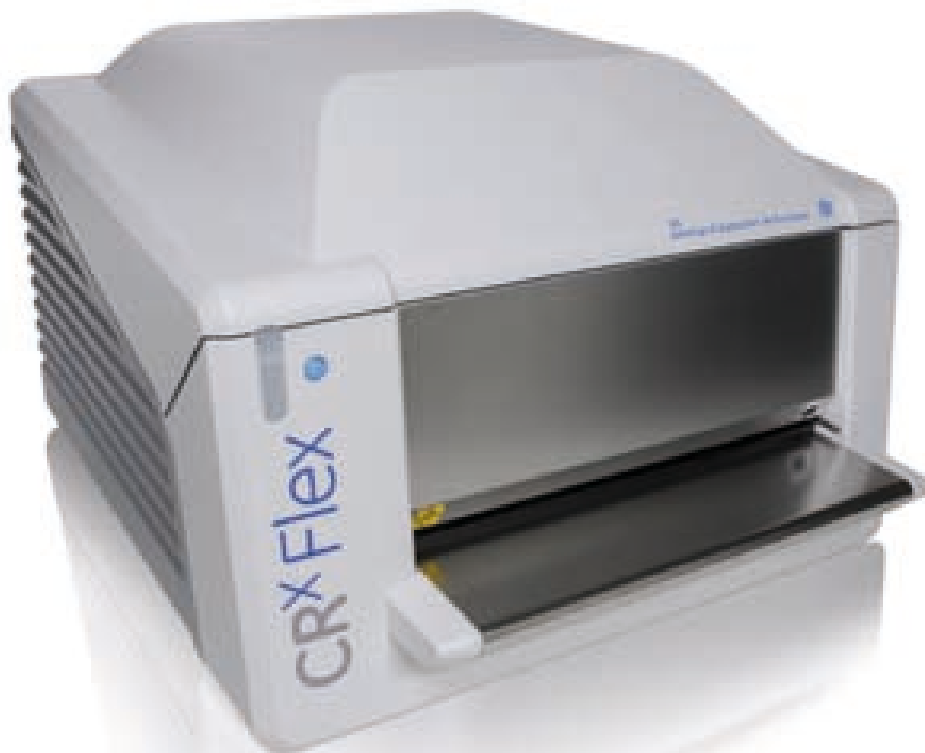
[www.ge-mcs.com/x-ray](http://www.ge-mcs.com/x-ray)

GEIT-40058EN (06/14)

GE  
Sensing & Inspection Technologies

# CR<sup>x</sup>Flex

Computed Radiography



## Reliability, Versatility and Performance in Harsh NDT Environments

The CR<sup>x</sup>Flex computed radiography scanner from GE Sensing & Inspection Technologies combines flexibility, reliability, dynamic range and ease-of-use.

Designed specifically for applications in non-destructive testing, the CR<sup>x</sup>Flex is suitable for usage with both isotopes and X-ray sources. It is well suited for a broad range of applications in the aerospace, oil & gas, power generation and automotive industries.



GE imagination at work

# Extending the Boundaries of Computed Radiography

## Versatility

The CR<sup>2</sup>Flex phosphor scanner also offers extremely wide dynamic range and high signal-to-noise ratio, which typically results in streamlined technique development and higher component throughput. A broad range of thicknesses can be inspected in a single exposure with the wide dynamic range making the CR<sup>2</sup>Flex a perfect match for the inspection of castings and/or piping for erosion/corrosion. This capability also leads to less exposures and fewer re-takes.

## Flexibility

One of the more unique features that the CR<sup>2</sup>Flex offers is its ability to be utilized with either hard cassettes (in which the phosphor imaging plate never leaves the cassette) or the ability to scan any size of phosphor screen up to 35 x 43 cm (14 x 17 inches): any unique shape or size: circles, triangles, rectangles, pie shape, etc. These unique sizes can be exposed using a soft, flexible cassette and then scanned by the CR<sup>2</sup>Flex.

## Reliability

The robust CR<sup>2</sup>Flex has a small tabletop footprint and is designed for reliable operation in the harshest of NDT environments. Its modular internal construction allows ease of servicing and features long mean-times-between-failures (MTBF) and maintenance (MTBM) — minimizing downtime and maximizing uptime.

## Horizontal Transport System

The CR<sup>2</sup>Flex has a state-of-the-art, horizontal transport system that is designed to have limited, or no direct contact with the imaging plate during the scanning process. The result of this is that there is no imaging plate damage and/or physical wear that occurs during the scan. The phosphor scanner can accept imaging plates that are used with soft cassettes and/or can be used in a hard cassette for applications in which the imaging plate would not have to be removed from the cassette — extending the life of the imaging plate.



## Superior Image Quality

Because of its specially designed optics, true square 50 micron pixel size and its unique 30 micron laser spot size, the CR<sup>2</sup>Flex can guarantee image quality with excellent IQI sensitivity. This superior image quality is supported by its BAM certificate that states that CR<sup>2</sup>Flex is IP Class Special/60 (ASTM E2446-05) and/or IP Class 1/60 (EN 14784-1) — ideal for weld inspection.

## Rhythm<sup>®</sup> Software

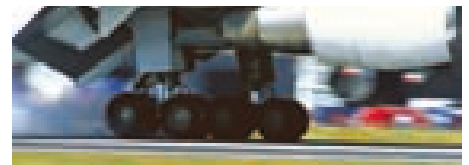
The CR<sup>2</sup>Flex, in conjunction with the GE's Rhythm software, allows users to acquire, review, report and archive inspection data. The DICOM-compliant Rhythm platform also permits image enhancement and data sharing to provide significant improvements in productivity and faster identification of defect indications.

## Applications

The CR<sup>2</sup>Flex is suitable for a wide range of applications spanning various industries.

### Aerospace

Manufacturing  
On-wing inspection



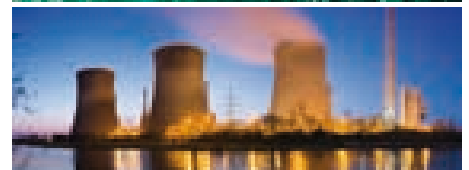
### Oil & Gas

Plant construction  
Asset management  
On-stream inspection



### Power generation

Plant construction  
Asset management



### Automotive

Component  
manufacturing  
Assembly inspection







## Imaging Plates

Our offering consists of different types of phosphor imaging plates. The plates have special/proprietary protection layers that prevent scratches and damage. Odd sizes and/or shapes up to 35 x 43 cm (14" x 17") imaging plates and associated inserts can be manufactured to support your specific application and scanned by the CR\*Flex.

### Fewer Retakes

High tolerance for varying exposure conditions and a greater freedom in the selection of the exposure dose.

### Dose Reduction

In many cases, imaging plates allow the visualization of all diagnostic information with only one exposure.

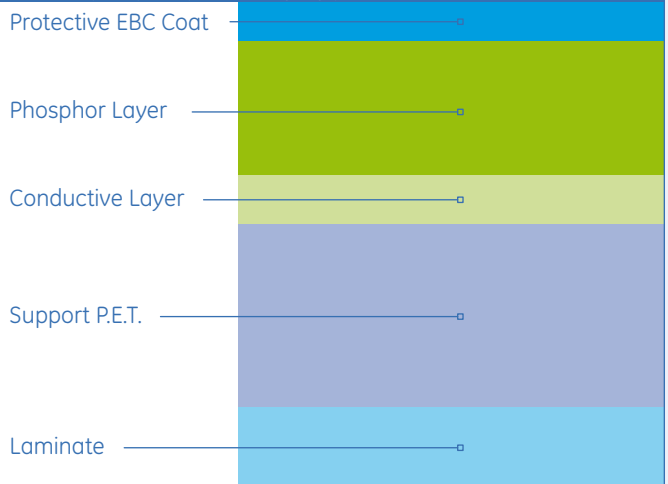
### Long Lifetime

Imaging plates are protected by an EBC (electron-beam-cured) topcoat. This results in plates with superb protection from mechanical wear and excellent chemical resistance.

### Image Quality

The composition of the imaging plate storage phosphor material ensures optimum performance. The material has high absorption efficiency, excellent homogeneity and short response time to ensure high sharpness and contrast.

### Make-up of phosphor imaging plates



## Cassettes

GE cassettes are specifically designed for NDT applications. The CR cassettes are lightweight and very simple to use. Synthetic material provides maximum rigidity for overall durability.

The higher radiation energies used in industrial X-ray makes the use of standard medical cassettes impossible. Therefore, the cassettes can be supplied with built-in, front lead (Pb) screens of 250µm (0.010") and are always lead-backed with 150µm (0.006") to ensure optimal backscatter protection resulting in optimal image quality.

## Technical Specifications - CR\*Flex

### Functional Data

Throughput (Cassettes/Hour)	35 x 43 cm (14 x 17")	54/Hour @ 100 µm 27/Hour @ 50 µm
	18 x 24 cm (7 x 9")	80/Hour @ 100 µm 40/Hour @ 50 µm
	<b>Multi-plate scanning</b>	
	e.g. 4 x (6 x 24 cm) OR 4 x (4.5 x 10")	216/Hour @ 100 µm 108/Hour @ 50 µm
Laser Spot Size	30 µm	
Pixel Size	50 µm and 100 µm	
Bit Depth	16-bit Linear	
Image Buffer	256 MB	
Certifications	CE, UL, RoHS, CCC, WEEE	
Dimensions	693 W x 786 D x 497 mm H (27.3 W x 30.9 D x 19.6" H)	
Weight	75 kg (165 lb)	
Interface	FireWire (IEEE 1394)	

### Electrical Data

Voltage	100 - 240 V AC, autosensing	
Frequency	50/60 Hz	
Power Consumption	120 W standby, 320 W peak	

### Consumables

Imaging Plate Sizes	All sizes up to 35 x 43 cm (14 x 17")	
Custom Imaging Plate Sizes	Any size and/or shape up to 35 x 43 cm (14 x 17")	
Cassette Sizes	35 x 43 cm (14 x 17")	
	15x 30 cm (6 x 12")	
	18 x 24 cm (7 x 9.5")	



[www.gesensinginspection.com](http://www.gesensinginspection.com)

GEIT-40044EN(02/09)

GE  
Measurement & Control

# CR<sup>x</sup>25P

Portable Computed Radiography



## Portability, Versatility and Performance in Harsh NDT Environments

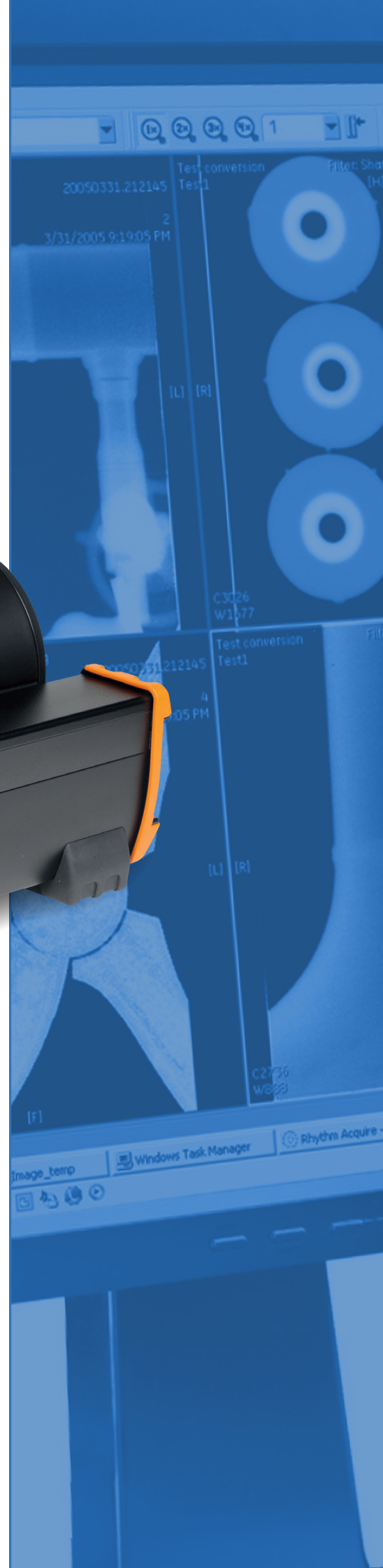
The CR<sup>x</sup>25P computed radiography scanner from GE's Inspection Technologies business combines portability and durability with simple operation to create high-quality digital images within seconds.

The scanner is constructed to withstand the demanding conditions of industrial radiography for both in house and field service applications.

The proven imaging performance of the CR<sup>x</sup>25P in conjunction with GE's phosphor plates is certified by the German BAM.



GE imagination at work



# Extending Computed Radiography to Portable Applications

## Designed for Field Service

Weighing only 21 kg (46 lb), the CR\*25P is a truly portable computed radiography system designed especially for applications requiring multiple relocation. The scanner offers a portable digital imaging solution for in-house, field and even off-shore applications where size and weight portability are critical to the environment and workflow.

A lightweight extruded aluminum frame resists dents. Rubberized isolating/damping feet minimize vibration and thus protect image quality. Users can select a rugged hard case. For operation in almost any environment, a built-in rechargeable battery option is also available.

## Critical decisions on the spot

The new scanner produces excellent quality digital images in just seconds. The image quality is reliably consistent and results are repeatable, enabling you to make critical decisions in almost real time.

## Simple, Familiar Operation

The CR\*25P scanner is extremely easy to use as it is seamlessly integrated into the Rhythm Software architecture. Imaging procedures are familiar because the system is built on familiar film techniques. Obtain quality digital images in three steps — Expose, Insert and View. These radiography systems produce a digital image by scanning reusable phosphor imaging plates (IP) coated with an X-ray photostimulable material. When exposed to X-ray or gamma rays emissions, the plate stores the image. Once the CR\*25P scans the plate, the image is ready for viewing on a computer within seconds. An in-line erase feature allows you to erase images in a single continuous cycle, so that you can immediately reuse the plates. The CR\*25P accepts Imaging Plates in all standard sizes up to 35 cm (14 in) wide, and a feed guide supports long plates during scanning.

## Focus on Image Details

Once you have scanned the images into a computer, you can use Rhythm imaging software, delivered together with the scanner to magnify, invert, sharpen and enlarge the images. You can alter brightness and contrast or apply line segment and angle measurement tools. Optional software tools like Flash!Filters enable instant image enhancement for faster reviewing and immediate decision-making. DICONDE image standards support retaining images and notes in a single file for consistent data management.



## Economical and Eco-Friendly

By eliminating the need to chemically process film (along with the related costs including storage and disposal), the CR\*25P cuts imaging expenses. Also, digital imaging aids in protecting the environment from harmful chemicals.

### Key Features

- Truly portable computed radiography system suitable for in-house and field service
- High and standard resolution images, capable of a resolution of 17 micron, 25 micron, 50 micron and 100 micron
- Can operate in direct sunlight
- Eliminates need for film, chemicals, and processor maintenance, as well as storage and disposal procedures
- Accepts phosphor imaging plates up to 35 cm (14 inch) wide by any practical length, and custom shapes
- Flexible, wire-free imaging plates to conform to object shape
- Feed guide supports long imaging plates
- Works with X-ray and gamma sources including Se 75, Ir 192 and Co 60
- Customizable settings for optimum dynamic range
- Built-in eraser with manual or auto erase function
- Lightweight extruded aluminum frame
- Hard-cases available for transportation
- Optional self-contained battery
- BAM Design-Type tested



# One Solution for Specific Applications



## CR\*25P Scanner

The CR\*25P represent the latest generation of portable scanners. It features an upgraded plate transport system, which optimizes plate handling and accepts flexible phosphor imaging plates up to 35.5 cm (14 inch) wide. The scanner offers all the acknowledged benefits of computed radiography over film radiography in terms of faster exposures, wider latitude, fewer retakes and overall reduced materials and labour costs.

The new CR\*25P replaces the CR50 for high contrast / medium resolution applications in the corrosion / erosion space. In addition, it extends the application space because of its high resolution mode at a pixel size of 17 and 25 micron and is therefore designed for weld inspection in compliance with international standards.

## Imaging Plates

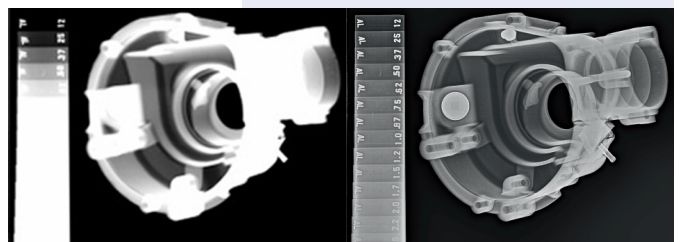
Our offering consists of different types of phosphor imaging plates. The plates have special/proprietary protection layers that prevent scratches and damage. Odd sizes and/or shapes up to 35 x 43 cm (14" x 17") imaging plates can be manufactured to support your specific application and scanned by the CR\*25P.

## Rhythm Software

The Rhythm Radiography software suite from GE combines advanced image acquisition, review and data management tools for all X-ray testing methods, including computed radiography, digital radiography and film digitization. Its advanced data sharing capabilities allow significant improvements in productivity and enable faster identification of quality problems, leading to reduced production defects or better in-service asset management.

### Key Features & Benefits

- **Save Time and Money:** Send information electronically to the inspection experts rather than sending the experts to the information. Automated Report Generators help to share information easily between workstations at different locations and within the supply chain.
- **Automate Specific Inspection Tasks:** Application specific tools improve process efficiency.
- **Improve Efficiency and Reproducibility:** Advanced image review tools for all modalities including computed radiography, digital radiography and film digitization.
- **Protect Your Investment:** Scalable architecture allows the solution to grow with your needs. DICOM/DICONDE compliance ensures your data will not become obsolete.
- **Reduce Training Requirements:** Quickly and easily learn this user friendly solution.



Two views of the same component. Left image shows a conventional radiograph (raw image), the one on the right with Flash! Filters software applied (enhanced image). See the difference in detail and resolution.

## Technical Specifications - CR\*25P

### Functional Data

Dimensions	39 cm (15 1/2") W x 46 cm (18") L X 35.5 cm (14") H
Weight	20 kg (44 lbs.) without optional battery, 21 kg (46 lbs.) with optional battery
Grey Level Resolution	16 bit, 65536 greylevels
Laser Spot size	12.5 µm
User Selectable Scan Resolution	17 µm, 25 µm, 50 µm and 100 µm
Interface	USB
Accessories	Flight case, 55 cm (21 1/2") W x 63.5 cm (25") L x 56.5 cm (22 1/4") H, 16 kg (36 lbs) Image Plate Guide/Extension Kit Compatible Rhythm software required (not included)

### Electrical Data

Voltage	110-240 V AC
Frequency	50/60 Hz

### Environmental Conditions

Operating Temperature	20 to 104°F (-7 to 40°C), Humidity: 5% to 95% (Non-condensing)
Storage and Transport Temperature:	-21 to 130°F (-29 to 55°C), Humidity: 5% to 95% (Non-condensing)

### Consumables

Imaging Plate Sizes	All sizes up to 35 x 43 cm (14" x 17") Note: Images scanned in High-Res modes (17 µm, 25 µm) may exceed the file- and memory size limitations of the used operating system, application filters or software modules. Please ask your sales or service representative for detailed information on usable plate formats.
---------------------	---

### Certifications

Class I Laser Product, Compliance with FDA HHS 21 CFR 1040.10 and IEC 60825-1
CE, UL
BAM Design-Type Tested

## Regional Contact Information

### North America

50 Industrial Park Road  
Lewistown, PA 17044  
USA  
+1 866 243 2638 (toll free)  
+1 717 242 0327

### Asia

5F, Building 1, No.1 Huatuo Road,  
Zhangjiang High-Tech Park,  
Shanghai 201203  
China  
+86 (0)21-3877 7888

### Europe

Bogenstrasse 41  
22926 Ahrensburg  
Germany  
Tel.: +49 4102 807 0



[www.ge-mcs.com](http://www.ge-mcs.com)

GEIT-40051EN (04/11)

# IPS & IPC2 Phosphor Imaging Plates

## Computed Radiography

Exclusively designed for industrial use, targeting all classes in both ASTM and CEN standards, the IPS and IPC2 Imaging Plates from GE Inspection Technologies deliver superior image quality, exposure speed and enhanced life. The combination of a wide dynamic range and exposure latitude results in substantial reduction of downtime and greater throughput. Both plates are the latest high-tech components of GE's computed radiography systems for industrial applications.

### Discover superior image quality

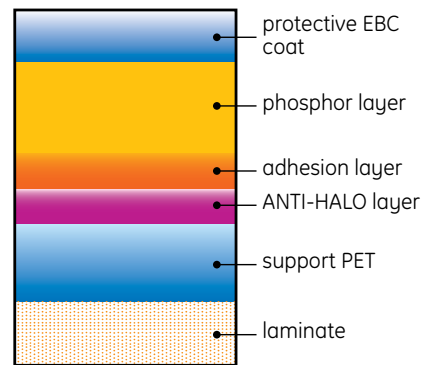
The storage phosphor in the IPS features excellent homogeneity and short response time. The previous pixel is fully faded before the laser stimulates the next one and, as a result, a very high level of sharpness and Signal-to-Noise Ratio (SNR) is obtained. The IPS imaging plate is ideal for weld inspection, castings, and honeycomb structure applications.

The storage phosphor in the IPC2 features high absorption efficiency with excellent homogeneity. This results in an extremely fast plate with higher image quality and better SNR than our traditional IPC. The IPC2 imaging plate is ideal for erosion-corrosion inspection applications.

### Enjoy enhanced durability and lifespan

Both IPS and IPC2 plates are protected by an Electron-Beam-Cured (EBC) topcoat. This is proprietary technology for hardening a pre-polymer lacquer coat into a high-density polymer shield protecting the phosphor layer. The results are superb resistance to mechanical wear and extensive immunity to chemical cleaning solutions.

Overall, you'll enjoy greater return on your investment.

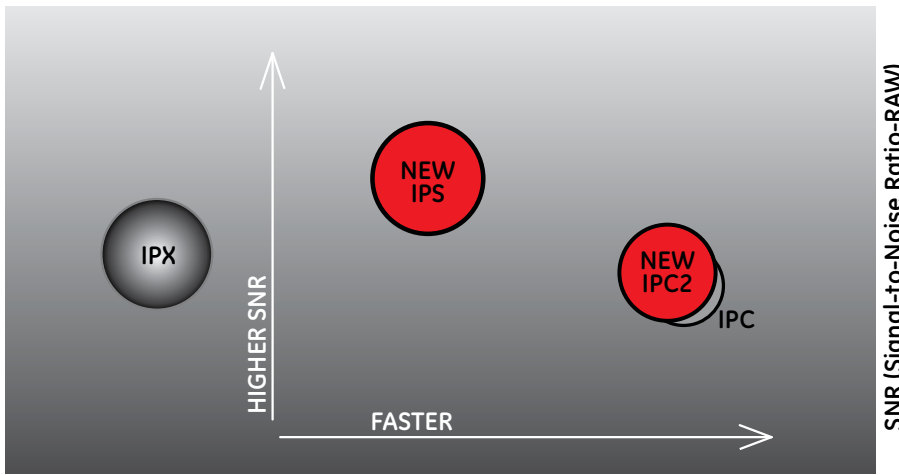


### Profit from greater efficiency

The storage phosphors on our CR plates have a wide dynamic range, resulting in high tolerance conditions and a larger degree of freedom in selecting the used exposure dose.

In addition, the wide exposure latitude of these imaging plates in many cases allows the visualization of all information with a single exposure - e.g. thick and thinner material. Combined, these features have the effect of drastically reducing the retake rate, helping substantially reduce downtime and/or facilitate higher throughput.

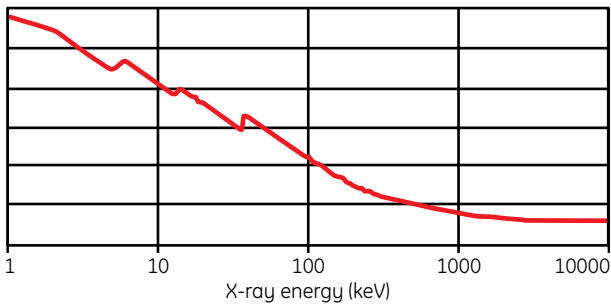




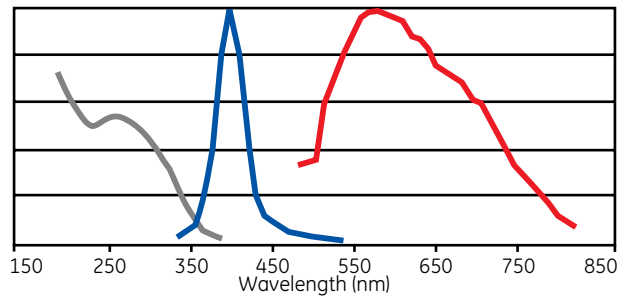
Exposure time at 3500 SAL

Relative exposure time and SNR using X-ray. The graph shows the improvement in speed, SNR and sharpness of the new IPS plates versus the former IPX. The new IPC2 results in an improved sharpness and SNR compared to the IPC.

Spectral absorption curve



Excitation-Emission-Stimulation



## Technical specifications:

- Phosphor composition:
  - BaSrFBrI:Eu<sup>2+</sup>
  - Typical luminescence: 390nm
- Sizes:
 

IPS:	14x17 inch	IPC2:	14x17 inch
	8x10 inch		8x10 inch
	6x12 inch		
	4,5x10 inch		
	4,5x17 inch		
- Customized sizes on request
- Handling:
  - Relative humidity: 30 – 80 %
  - Temperature: 10° C – 40° C (50° F – 104° F)
- Cleaning
  - For plate maintenance use only GE's Cleaning Wipes

## GE Inspection Technologies The evolution of NDT

When it comes to technology-driven, non-destructive testing (NDT) solutions, GE Inspection Technologies has been setting the global standard. Our radiography systems epitomize our expertise in pioneering and developing proven technologies that offer real, tangible benefits for industries from aerospace to oil and gas.





# GE Film Digitizer

FS50 / FS50B

## GE Film Digitizers FS50 / FS50B

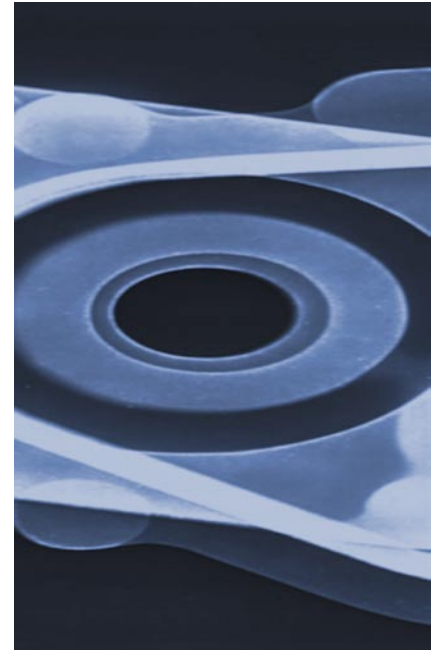
are designed to provide high-end performance in film digitizing, offering superior quality at high throughput. The steel housing gives the robustness needed for the industrial environment of NDT applications. All standard film formats can be digitized, up to a width of 14 inch (35 cm), without length limitation in any resolution between 50  $\mu\text{m}$  and 500  $\mu\text{m}$ . The FS50B is the first and only digitizer on the market that can handle the full density range ( $D = 0$  up to 4.70 D) in one working range with the requested contrast sensitivity. This makes the scanner meet the requirements for class DS film digitizers, according to EN 14096 part 2. This classification has been evaluated and confirmed by BAM, the German Federal Institute for Materials Research and Testing.

The system employs a HeNe laser beam, which sweeps across the film by a polygon mirror system. The F-Teta lens avoids distortions of the image, by keeping the optical distance of the laser beam unchanged at all spots of the scanned area. The logarithmic amplification process guarantees high signal to noise ratios up to 4.70 density (FS50B).



Every scanner is calibrated and characterized at the time of shipment, and a unit-specific LUT is delivered with each machine. This guarantees an artifact-free scanning at the highest possible precision, repeatability and speed. A 14 x 17 inch film can be digitized in as little as 7 seconds.

The cost-effective film digitization solution for anyone handling archives, for easy image transfer or for using the advanced viewing features of the GE Inspection Technologies system.



## Technical Specifications FS50 / FS50B

Light source	HeNe laser 632.8 nm
Laser scan resolution	50 µm to 500 µm in steps of 1 µm
Density range FS50	0.05 to 4.0 D
Density range FS50B	0.05 to 4.7 D
Scan speed	14 x 17 inch: 7 sec (Speed mode, 200 µm) 14 x 17 inch: 120 sec (Quality mode, 50 µm)
Pixel depth	12 bit (4096 gray levels) logarithmic
Film size	Min: 60 mm - 2.4 inch width Max: 355 mm - 14 inch width
Weight	45 kg
Dimensions	526 x 764 x 330 mm - 13 x 21 x 30 inch
Interface	SCSI, SCSI II
Power	100 - 120 V; 200 - 240 V 50 / 60 Hz; 400 W
Safety labels	CE, UL, GS
Operating condition	15 - 30 °C (59 - 86 °F), 30 - 75% RH
Storing condition	10 - 40 °C (14 - 104 °F), 10 - 90% RH
Transportation condition	10 - 50 °C (14 - 122 °F), 10 - 90% RH



Film Digitizer FS50



- ✦ Computed Radiography Imaging System
- ✦ Greater than 4 lp/mm, 16-bit Images
- ✦ On Target Equipment Weight Less Than 20 lbs (9 kg)
- ✦ Internal or External Image Plate Erasing Light
- ✦ Contact Free Image Processing

# LOGOS



# LOGOS

The Logos Digital Imaging System offers users a truly portable Computed Radiography (CR) product designed to be field deployable. With a footprint measuring 31 inches x 23 inches, the complete Pelican case mounted system fits in a typical response vehicle for easy transport to and from the work site. Additionally, the soft-sided carrying case option offers users the flexibility of choosing a smaller, one-man portable design.

The system uses thin, flexible, storage phosphor plates as the imaging medium. These image plates are reusable after being erased with fluorescent light, and they can be connected using the supplied image plate frame system to x-ray large objects in a single exposure with minimal downrange equipment weight and minimal downrange time.

The scanner relies on a contact free, carousel based scanning method to read the image plates. The benefit of contact free scanning is that dust and debris on the image plate surface will not damage the plate or the scanner during processing. Therefore, even in extreme environments, there is no consumable expense for daily cleaning products required to maintain trouble-free operation.

The wide dynamic range of the Logos Digital Imaging System also allows users the ability to capture a quality image in one X-ray exposure. The scanner outputs 16-bit grayscale images (65,536 levels of gray) providing a high level of contrast adjustment to easily correct over and under exposures without requiring another trip downrange. The standard Logos Imaging Application offers a suite of automated image processing filters enabling even novice computer users to quickly capitalize on this powerful image processing capability.

## Specifications

Height:	15.5", 39.4 cm
Width:	19.4", 49.3 cm
Depth:	10.8", 27.4 cm
Weight:	35 lbs, 16 kg
Interface Cable:	USB 2.0 Cable
Voltage:	110-240 VAC
Frequency:	50/60 Hz
Power:	110 watts max (T100 - w/o integrated eraser) 150 watts max (T110 - with integrated eraser)
Laser Classification:	Compliance per DHHS Radiation Performance Standards 21 CFR, 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007. Also complies with IEC60825-1/A2: 2001 Class 1 Laser Device
Image Plate Size:	8"x10", 20 x 25 cm & 8"x17", 20 x 43 cm
Resolution:	150 dpi, 2.2 lp/mm, 51 second scan; 300 dpi, 4.4 lp/mm, 102 second scan

\*\*\*Specifications are subject to change without notice\*\*\*



## DETEK, Inc.

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com





- ✦ Compact, Desktop, Single Plate Reader
- ✦ 25 Plates/hr (14"x 17"), 60 sec to Image Display
- ✦ Multiple Image Plate Size Options
- ✦ Industry Leading Image Quality
- ✦ Logos Software Platform

**EVRY**  
ΕΥΡΥ





# EVRY

## Specifications

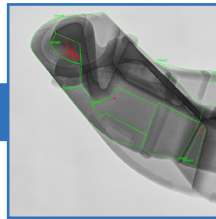
CR Reader Type	Compact Desktop Reader with Integrated Image Plate Eraser	Storage and Shipping	-40° to 122° F (-40° to 50° C) (stored inside carrying case)
Image Plate & Cassette Sizes	14" x 17" (35 x 43 cm) 10" x 12" (25.4 x 30.5 cm) 8" x 10" (20.3 x 25.4 cm)	Environmental Operating Conditions (Reader)	Temperature 32° to 104° F (0° to 40° C) Relative Humidity 5% to 95% RH, Non-condensing
Throughput (with 120 sec erase / IP)		Environmental Operating Conditions (Image Plate)	Temperature 59° to 93° F (15° to 34° C) Relative Humidity 30% to 80% RH, Non-condensing
Standard Resolution	15 plates / hour	Safety Standards	
High Resolution	13 plates / hour	General	UL 60601-1 ( 2003), IEC 60601-1 (2005) CAN/CSA C22.2 No 601.1-M90
Image Display Time		EMI	EN 60601-1-2 (2007) Group 1 Class A IEC 60601-1-2 (2007) Group 1 Class A
Standard Resolution	90 seconds	Electrical	Class I (grounded)
High Resolution	130 seconds	Laser	IEC 60825-1 (2007) Class 1 Laser Device
Resolution			
Standard	150 DPI (5.9 pixels/mm) 169 micron square pixels approximately 2.9 lp/mm		
High	300 DPI (11.8 pixels/mm) 85 micron square pixels approximately 5.9 lp/mm		
16 bits/pixel			
Weight	49 lbs (22 kg)		
Dimensions (H,W,D)	12.6" x 28.4" x 16.4" (32 x 72.1 x 41.7 cm)		
Interface Cable	USB 2.0		
Electrical Voltage	100-240 VAC, 50/60 Hz Auto-sensing		
Power	110 W Max - 200 VA Max		



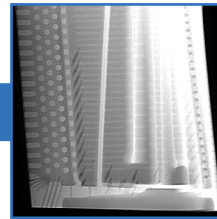
**DETEK, Inc.**  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
**800-638-0554**    **FAX 301-449-7011**  
www.detek.com    sales@detek.com

# Seifert x|cube series

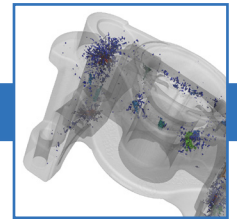
Versatile X-ray system for real-time 2D inspection with 3D computed tomography option



Assisted automatic 2D defect recognition (ADR) in an aluminum casting



Radiographic turbine blade inspection



Precise defect localization and quantitative porosity analysis with 3D CT

## Key features & benefits

- Wide application range from automotive's high throughput requirements up to high resolution requirements for aviation casting
- The new 320 kV version comes with maintenance free high voltage plugs and can handle samples up to 300 kg
- Simple loading with extractable parts manipulator
- Max. sample size 600x900 mm (800x1,500 x|cube XL)
- Patented extremely low vibration C arm manipulator, flexible swivel angle of +45° to -45°
- Robust design and intuitive operator guidance with x|touch® control panel and teach and learn functions
- DICOM standard compliant image management
- Optional CT functionality for virtual 3D sections and quantitative porosity analysis



# 2D X-ray real-time inspection

## Flexible automotive and aerospace components assessment

Besides the inspection of safety-relevant castings in the automotive and aerospace industry, the Seifert x|cube is also applied in all areas of industry where there is a need for the fast and effective X-ray inspection of castings, welded structures, plastics, ceramics and special alloys. Its versatility means that it can be used equally well in production, incoming materials inspection and failure analysis environments. Its robust design and the software safety cage ensure it is also ideal for busy industrial areas. The proven Seifert inspection system is now even faster, more flexible and easier to use, while offering a full computed tomography option for when traditional 2D radioscopy is unable to provide clear results.



## Designed for a wide application range

Depending on the inspection task, two x|cube models are available:

- The x|cube Compact is offered with 160 kV, 225 kV or 320 kV, and can handle workpiece dimensions of up to 600 mm diameter and 900 mm height, and an overall weight of up to 100 kg (max. 300 kg at 320 kV).
- The XL model, available with 160 kV or 225 kV, has a larger X-ray protection cabinet and is, thus, suitable for the X-ray inspection of parts with dimensions of up to 800 mm diameter and 1,500 mm height.

## Fast, flexible and easy to use

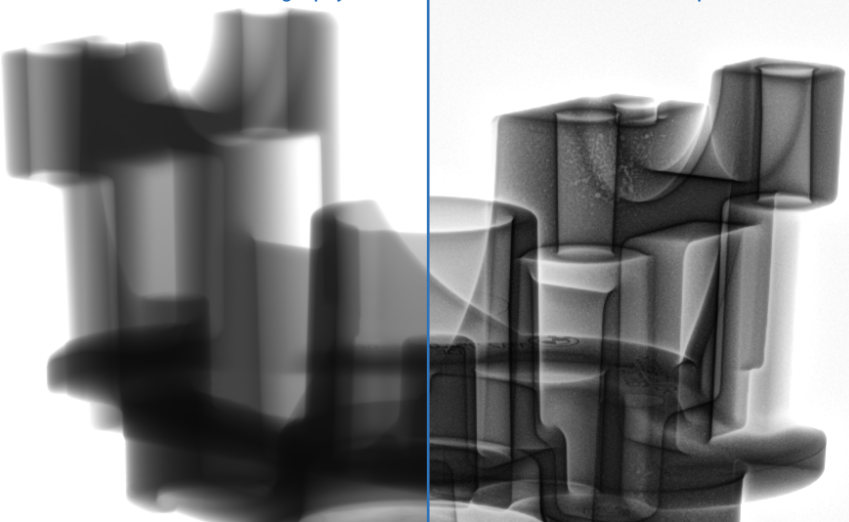
A number of innovative elements ensure that the Seifert x|cube is extremely easy to use. Faster set-up, cycle and image management times result in improved productivity:

- Immediate operational availability without homing
- Fast PLC-type Fanuc servo drives
- Intuitive user guidance with teach and learn capabilities
- x|touch® panel for easy teach-in inspection program creation in less than 30 seconds
- Software safety cage to prevent collisions
- VISTAPLUS software for live, top quality images
- Optional automatic 2D defect recognition (ADR)



Conventional radiography

Flash!Filters™ optimized



## Flash!Filters™: See more – know more

GE's proprietary image optimization technology provides brilliant inspection results optimized for the human eye. This helps significantly to ensure short failure detection times and rich contrast increasing failure detection rate and therefore productivity.

Two options are available:

- Flash!Filters™ for casting inspection
- Flash!Filters™ for weld inspection

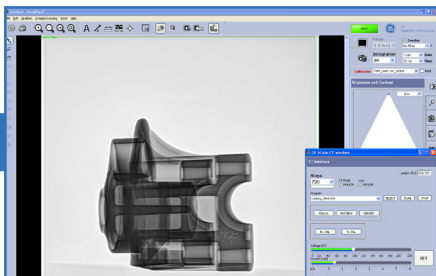
# Quantitative 3D failure analysis with CT

Determine the shape, position and size of defects

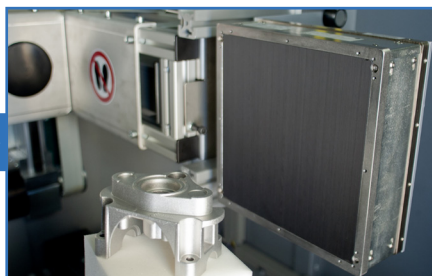
The new computed tomography option converts the Seifert x|cube into an extremely versatile inspection system that also enables detailed 3D inspections. Thanks to the highly dynamic GE DXR digital detectors, it is possible to display the finest contrast differences such as caused by hidden porosity. The program for CT set-up, image acquisition, volume reconstruction and visualization is easy to use. In contrast to 2D X-ray inspection, 3D analysis and process control using volume data offer considerable advantages:

- Reduction of the reject rate due to the 3D analysis of the position, shape and size of defects
- Depending on their size and their absorption behaviour, impurities, such as inclusions or sand core residue in castings or composite delamination, can be detected, located and classified according to their actual density and position

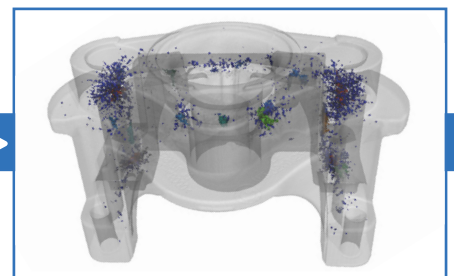
## Computed tomography workflow:



With the GE intuitive software it takes just a few clicks to set up the CT scan...



... while the workpiece rotates in the X-ray beam, the extremely fast GE DXR flat panel detector captures a series of 2D radiographic images...



... the reconstructed volume is automatically opened for the 3D analysis and enables, e.g., any virtual sections and quantitative pore analyses.

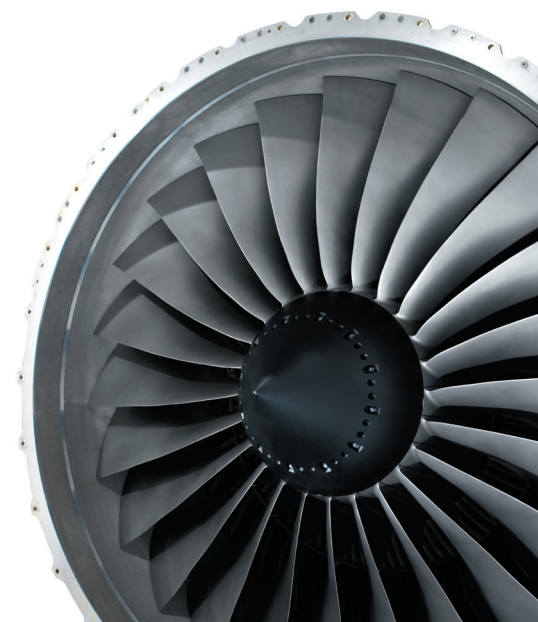
## ASTM and DICONDE compliant inspection solution

The x|cube ensures X-ray inspection according to international NDE standards:

- Interface to GE Rhythm software for inspection and automatic image archiving compliant with the international DICONDE standard which incorporates many features that are NDE-focused describing all of the necessary syntax, attributes and data elements

## Seifert x|cube – your benefits

- Fast and flexible for a wide range of 160, 225 or 320 kV applications
- Inspection task programming and ADR for high sample throughput
- Intuitive operator guidance
- Visual real-time inspection combined with optional 3D CT capability
- DICONDE compliant digital image analysis and data management
- Modular design configuration for customer oriented solutions
- All relevant hardware and software components are GE technology
- Reduced maintenance – lower operating costs





# Technical specifications



Seifert x cube	Compact			XL	
Energy (max.)	160 kV	225 kV	320 kV	160 kV	225 kV
Max. sample size (Ø x height in mm)	600 x 900 **	600 x 900 **	600 x 900 **	800 x 1500**	800 x 1500**
Max. sample weight	100 kg *	100 kg *	300 kg *	100 kg *	100 kg *
Cabinet dimensions, incl. backpack (L x W x H in mm)	2540 x 1700 x 2455	2540 x 1700 x 2455	2540 x 2230 x 2400	2865 x 2106 x 3100	2865 x 2106 x 3100
Cabinet weight approx.	3950 kg	4550 kg	10.500 kg	6550 kg	6550 kg
Control panel weight approx.	350 kg				
<b>Manipulation Travel</b>					
Max. horizontal motion across the X-ray beam	650 mm		660 mm	850 mm	
Max. external loading/unloading position	250 mm		150 mm	250 mm	
Max. horizontal motion magnification axis	650 mm		620 mm	850 mm	
Focus detector distance (FDD)	800-1000 mm		800-1050 mm	1000 - 1200 mm	
Max. vertical motion	900 mm		950 mm	1500 mm	
Max. tilt of the C arm	± 45°				
Max. sample rotation	n x 360°				
<b>2D software</b>	Integrated image optimization system VISTAPLUS, optional with semi-automatic defect recognition (pass/fail assessment by the operator)				
<b>System control</b>	Simple and intuitive system control and programming of recurring inspection tasks thanks to X-Touch® Panel				
<b>Control / Drives</b>	Hardware PLC PC independent / Fanuc servo drives				
<b>Detector options</b>	Selection of various digital flat panel detectors, e.g. temperature stabilized highly-dynamic GE DXR 250RT digital detector for pin sharp live images and very fast CT scans, the GE DXR 500 L detector for particularly high-resolution applications or the DXR 250 providing a large active area				
<b>Flash!Filters™ option</b>	Proprietary live image optimization technology for easier visual defect detection in castings or weldings				
<b>Tube options</b>	Various mini to macro focuses as well as various high-power X-ray tubes up to 320 kV for Compact, 225 kV for XL				
<b>Computed tomography add-on</b>	CT package contains all the required hardware and software components for combined 2D/3D operation with GE detectors				
<b>CT scan range</b>	Max. 170 mm Ø x 170 mm height at DXR 250RT 8"x8" detector				
<b>Min. voxel size</b>	Up to 100 µm, depending on the sample size				
<b>Connection values / capacity</b>	3N PE 400/230V 50/60 Hz, 35 A (160+225 kV), 50 A (320 kV), TN-S or TN-CS network / up to approx. 16 kVA***				
<b>Earthing</b>	Separate earthing for X-ray device and high-voltage generator (< 2 Ω) with at least 6 mm <sup>2</sup>				
<b>Means of transport</b>	Complete X-ray protection cabinet with fork lift truck / Control panel (on pallet) with fork lift truck				
<b>Ambient conditions (in accordance with IEC 60 601-1)</b>	Ambient temperature +10° C to +40° C, air pressure 700 hPa to 1060 hPa				
<b>Compliant with national and international standards</b>	ISO 9001; VDE 0100; UW; DIN EN 60204 (VDE 0113); VBG; DIN EN 60529 / IEC 529; German Radiation Control Act (RöV) of 1987 (with amendments in the current version); DIN EN 954-1; CFR 1020.40; DIN 54113				
<b>Radiation protection</b>	The radiation safety cabinet is a full protective installation without type approval according to the German RöV. It complies with French NFC 74 100 and the US Performance Standard 21 CFR Subchapter J. For operation, other official licenses may be necessary.				

\* Depends on the loading position.

\*\* Longer workpieces are possible, this involves the workpiece being reloaded and inspected.

\*\*\* Depends on the applied X-ray tube

**Note:** The inspection volume that can be X-rayed varies according to the total wall thickness and the material density.

[www.ge-mcs.com/x-ray](http://www.ge-mcs.com/x-ray)



**GE Sensing & Inspection Technologies GmbH**  
 Bogenstr. 41  
 22926 Ahrensburg  
 Germany

Tel.: +49 4102 807 0  
 Fax: +49 4102 807 277  
 E-mail: [xray.info@ge.com](mailto:xray.info@ge.com)

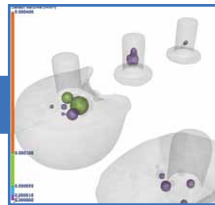
**GE Inspection Technologies, LP**  
 50 Industrial Park Rd  
 Lewistown, PA 17044  
 USA

Tel.: 717 242 03 27  
 Fax: 717-242-2606  
 E-mail: [phoenix-usa@ge.com](mailto:phoenix-usa@ge.com)

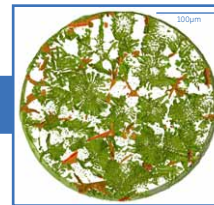


# phoenix nanotom m

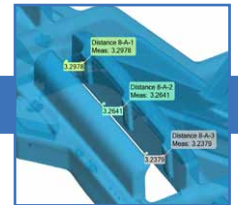
180 kV / 20 W X-ray nanoCT<sup>®</sup> system for high-resolution analysis and 3D metrology



nanoCT<sup>®</sup> of TSVs in an electronic package. The voids in the copper filling are clearly visible.



3D volume slice of an AlMg5Si7 alloy (Ø 350 µm): Fe-aluminides and Mg<sub>2</sub>Si-phases.



3D metrology image of an injection molded part showing feature details.

## Key features & benefits

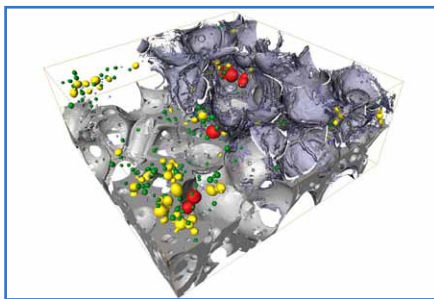
- Unique temperature stabilized digital GE DXR detector (3,072 x 2,400 pixels) for a high dynamic range > 10,000 : 1 and up to 4 times faster data acquisition at the same high image quality level
- Granite-based manipulator for high stability
- Max. sample size 240 mm Ø x 250 mm in height
- New open 180 kV / 15 W high-power nanofocus X-ray tube with down to 200 nm detail detectability, optimized for long-term stability
- diamond|window for extremely high focal spot stability and up to 2 times faster data acquisition at the same high image quality level
- Down to 300 nm minimum voxel size
- Optimized ease of use due to intelligent system design and advanced phoenix datos|x CT software
- 3D metrology package with temperature stabilized cabinet and high accuracy direct measuring system



# phoenix nanotom m

## Versatile 3D computed tomography system

High-resolution computed tomography (CT) has become a powerful inspection tool for a wide range of industrial and scientific inspection and metrology applications such as non-destructive structure and failure analysis as well as for quality assurance or production control. With its 180 kV / 20 W ultra high performance nanofocus X-ray tube, precision mechanics and advanced software modules, the phoenix nanotom m is the inspection solution for a wide range of 3D CT applications. Once scanned, the fully three dimensional CT information allows many possibilities for analysis, e.g. non-destructive visualization of slices, arbitrary sectional views, or automatic pore analysis. Since the whole geometry of the object is scanned, precise and reproducible 3D measurements of complex objects and even the automatic generation of first article inspection reports within an hour are possible.



3D nanoCT® evaluation of artificial bone (ceramics matrix with aluminium coating)

## nanoCT® – closest to synchrotron CT

With its special design, the nanotom m provides focal spot sizes in the submicron range. Smaller focal spots ensure very little geometric unsharpness and therefore improved image resolution. And due to the new high dynamic range GE DXR detector the system offers long-term stable and optimized image quality.

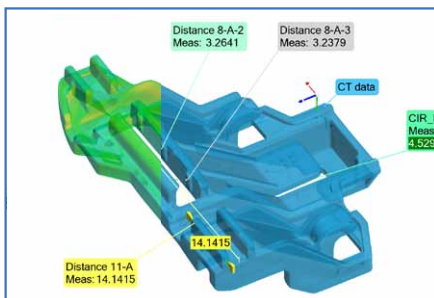
In pursuit of high-resolution images, the potential, convenience and economy of nanoCT can compete in many application fields with limited available synchrotron facilities, e.g.:

- Materials science
- Micro-engineering
- Electronics
- Life sciences
- Geosciences and much more

## 3D metrology with high-resolution CT

Especially if complex parts with hidden or difficult accessible surfaces have to be measured, CT offers big advantages in comparison with conventional tactile or optical coordinate measuring machines (CMMs). With its optimized 3D metrology package, the phoenix nanotom m includes all essential features for CT with extremely high accuracy and reproducibility:

- Temperature stabilized cabinet
- High accuracy direct measuring system
- Vibration insulation of the manipulator
- Temperature stabilized GE DXR detector for brilliant image quality
- Long-term stability optimized X-ray tube with diamond|window – reduction of artefacts
- 2 calibration objects
- phoenix datos|x software “click & measure|CT” and “metrology”



CAD variance analysis and measurement of 5 features of an injection molded part

First article inspection report in less than 1 hour possible

# phoenix datos|x advanced CT software

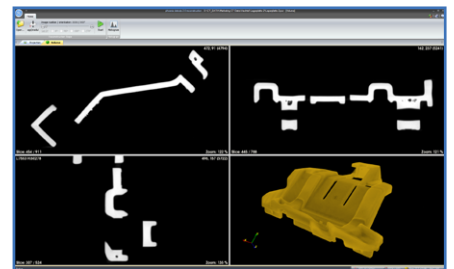
## Fully automated data acquisition and volume processing

With datos|x, the entire CT process chain can be fully automated. This minimizes operator time and influence, while highly increasing the repeatability and reproducibility of CT results. Once the appropriate setup is programmed, the whole scan and reconstruction process incl. volume optimization features (e.g. automatic beam hardening correction) or surface extraction can be fully automated. Furthermore, 3D failure analysis or metrology tasks like generation of first article inspection reports can be executed automatically.

## Precise, reliable and fast CT results

By using phoenix datos|x CT software, 3D metrology and failure analysis with phoenix|x-ray CT systems becomes as fast and easy as never before

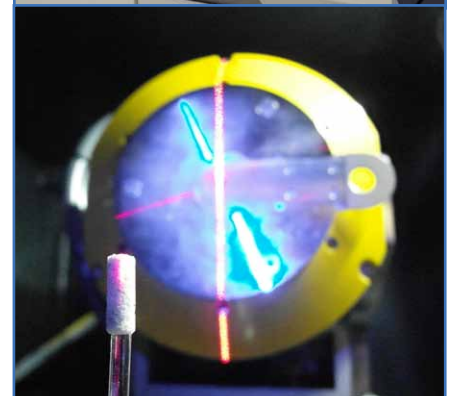
- click & measure|CT: Fully automated data acquisition and volume processing – insert sample, start CT scan, check results
- Reproducible high precision 3D metrology and failure analysis tasks performed with a minimum of operator training
- Significant reduction of required operator time by factor of up to 5
- Wide spectrum of modules for ease of use and accurate CT results
- Accelerated sample throughput due to batch CT scans and up to 9 times faster volume reconstruction



Intuitive graphical user interface for easy usage and a fast learning curve due to clear display of CT results in 2D axis views and 3D render mode.

## phoenix nanotom m - Your Advantages

- Unique spatial and contrast resolution on a wide sample range - from small material to medium sized plastic samples covering 3 orders of magnitude (0.25 mm to 250 mm sample size)
- Optimized 3D metrology package for stable acquisition conditions, fast reconstruction within minutes and reproducible measurement results
- Extremely high image quality due to unique temperature stabilized GE DXR detector (3,072 x 2,400 pixels) with a high dynamic range > 10,000 : 1
- Max. sample size 240 mm Ø x 250 mm in height and 3 kg (6.6 lbs.) in weight
- Automatic and continuous adjustment of the magnification
- Optimized ease of use due to system design and advanced phoenix datos|x CT software



New tube design optimized for long-term stability

# Technical Specifications & Configurations



	phoenix nanotom s	phoenix nanotom m
X-ray tube type	Proprietary open high-power nanofocus X-ray tube, optimized for long-term stability	
	Optional X-ray tube cooling	Internal X-ray tube cooling
Max. voltage / power	180 kV / 20 W	
Target	Tungsten on beryllium (optional tungsten on CVD diamond)	Tungsten on CVD diamond for up to 2 times faster data acquisition at the same high image quality level
	Transmission target type, rotatable for multiple use (other target materials, e.g. molybdenum on request)	
Filament	Tungsten hairpin, pre-adjusted plug-in cartridges for fast and easy exchange	
Geom. magnification (3D)	1.7 x - 250 x	1.5 x - 300 x
Detail detectability	Down to 200 nm (0.2 microns)	Down to 200 nm (0.2 microns)
Min. voxel size	Down to 500 nm (0.5 microns)	Down to 300 nm (0.3 microns)
Detector type	High-Contrast Detector HCD 120-50, 12 bit, 3 x virtual detector enlargement (max. 6,900 pixel detector width)	Temperature-stabilized high dynamic GE DXR, 14 bit, 1.5 x detector enlargement (max. 4,600 pixel detector width)
Pixels	2,300 x 2,300	3,072 x 2,400
Pixel size	50 µm	100 µm
Manipulation	Granite based 5-axes manipulator with vibration insulation, precision rotation table on air bearings	
Variable focus detector distance	from 200 mm to 500 mm	from 220 mm to 600 mm
Max. sample diameter	< 1 mm to 120 mm	< 1 mm to 240 mm
Max. sample height / weight	150 mm / 2 kg (4.4 lbs.)	250 mm / 3 kg (6.6 lbs.)
Sample travel length Y / Z	150 mm / 300 mm	250 mm / 400 mm
Rotation	0° - 360° x n	
System dimensions	1,630 mm x 1,432 mm x 740 mm (64.2" x 56.3" x 29.1")	1,980 mm x 1,600 mm x 925 mm (78" x 63" x 36.4")
System weight	Appr. 1,300 kg / 2,870 lbs.	Appr. 1,900 kg / 4,190 lbs.
Optional 3D metrology bundle		Temperature stabilized cabinet, high accuracy direct measuring system, calibration object, datos x module packages "metrology" and "click & measure CT"
Software	phoenix datos x 3D computed tomography acquisition and reconstruction software. Different 3D evaluation software packages for 3D metrology, failure or structure analysis on request.	
CT reconstruction	phoenix datos velo CT speed (2 GPUs)	phoenix datos velo CT high-speed (5 GPUs)
Basic datos x modules	auto ROI, sector scan, fast scan, multi scan, multi volume reconstruction, agc module - automatic geometry calibration, bhc+ module - automatic beam hardening correction, rar module - ring artefact reduction,	
Optional modules	datos x module package 3D "metrology", datos x module package "click & measure CT"	
Optional advanced sample manipulation	Manual XY highly accurate positioning table, tensile & compression testing stage system, coolstage specimen cooling unit	
		Motorized XY-table with two linear axes
Radiation protection	The radiation safety cabinet is a full protective installation without type approval according to the German RöV, complies with French NFC 74 100 and the US Performance Standard 21 CFR Subchapter J. For system operation, other official licenses may be necessary	

[www.ge-mcs.com/phoenix](http://www.ge-mcs.com/phoenix)



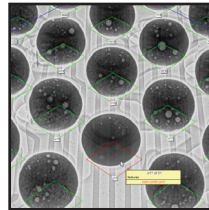
**GE Sensing & Inspection Technologies GmbH**  
 Niels-Bohr-Str. 7  
 D-31515 Wunstorf, Germany  
 Tel.: +49 5031 172 0  
 Fax: +49 5031 172 299  
 E-mail: phoenix-info@ge.com

**GE Inspection Technologies, LP**  
 50 Industrial Park Rd  
 Lewistown, PA 17044, USA  
 Tel.: 717 242 03 27  
 Fax: 717-242-2606  
 E-mail: phoenix-usa@ge.com

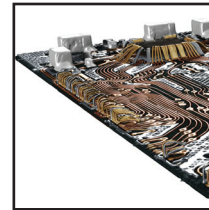
GEIT-31344EN (09/14)

# phoenix microme|x / nanome|x

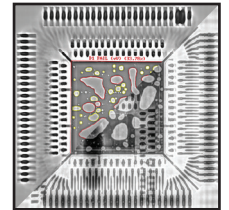
High resolution 180 kV micro- / nanofocus X-ray inspection systems with 3D CT option



Open BGA ball with live CAD data overlay and Flash! Filters™ image optimization



3D Computed Tomography of an USB flash drive



Advanced planarCT evaluation (left) without overlaying features in the X-ray image

## Unique features

- Temperature stabilized digital DXR detector with active cooling for high dynamic live imaging
- 180 kV / 20 W high-power micro- / nanofocus tube with up to 0.5  $\mu\text{m}$  or 0.2  $\mu\text{m}$  detail detectability
- x|act package for CAD based  $\mu\text{AXI}$  programming and automatic inspection
- diamond|window for up to 2 times faster data acquisition at the same high image quality level
- Optionally 3D computed tomography scans within 10 seconds



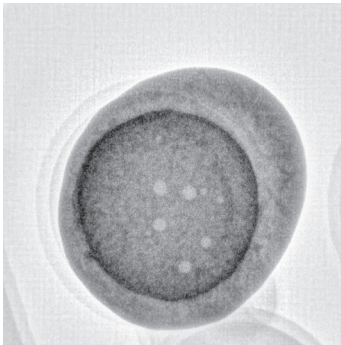


# phoenix micromex / nanomex

## The high performance X-ray inspection solution

The phoenix micromex and nanomex series combines high-resolution 2D X-ray technology and 3D CT in one system. Innovative and unique features and an extreme high positioning accuracy make both systems the effective and reliable solution for a wide spectrum of 2D and 3D offline inspection tasks: R&D, failure analysis, process and quality control.

The phoenix|x-ray x|act technology offers easy to program CAD based  $\mu$ AXI ensuring automated inspection in the micrometer range. Another unique benefit is GE's highly dynamic DXR flat panel detector with active cooling. Offering up to 30 frames per second, it provides outstanding brilliant live imaging and fast data acquisition for 3D CT.



Flash! filtered voids in an open  $\mu$ BGA ball: 1,970x geometric zoom for extreme high magnification

## Brilliant DXR-HD live imaging

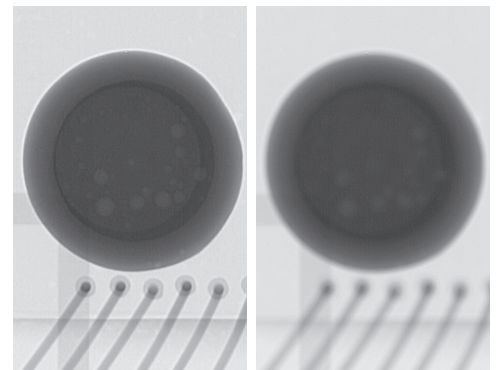
With GE's proprietary high dynamic DXR detector with enhanced scintillator technology phoenix|x-ray introduces a new industry standard for efficient live inspection:

- Full frame rate of 30 frames per second at 1000x1000 pixels offers low noise coupled with brilliant image quality ensuring fast and detailed live inspection
- Active temperature stabilization for precise and reliable inspection results
- Extremely fast data acquisition in 3D CT mode
- Detail detectability down to  $0.5 \mu\text{m}$  /  $0.2 \mu\text{m}$  for high performance failure analysis

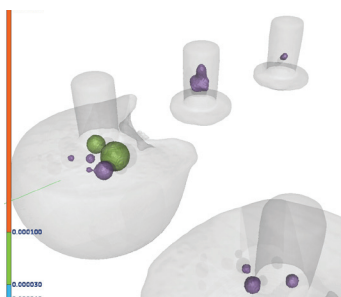
## High output with high-resolution: diamond|window

Compared to conventional beryllium targets, the diamond|window allows higher power at a smaller focal spot. This ensures high-resolution even at a high output.

- Up to 2 times faster CT data acquisition at the same high image quality level
- High output with high-resolution
- Non-toxic target
- Improved focal spot position stability within long term measurements
- Increased target lifetime due to less degradation with higher power density



diamond|window      beryllium window  
(same X-ray tube parameter: 130 kV, 11.4 W)



nanoCT® of TSVs in an electronic package. The voids in the copper filling are clearly visible.

## High-resolution 3D computed tomography

For advanced inspection and 3D analysis of smaller samples, phoenix|x-ray's proprietary 3D CT technology is optionally available.

- 180 kV high power X-ray technology, fast image acquisition with DXR detector and diamond window combined with phoenix|x-ray's fast reconstruction software deliver high quality inspection results
- Maximum voxel resolution down to 2 microns; the nanoCT® capability of the nanomex allows even a higher image sharpness

# x|act - CAD based inspection:

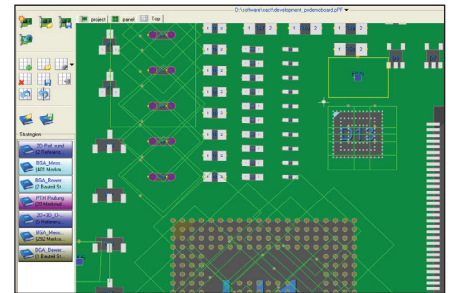
high resolution  $\mu$ AXI for extremely high defect coverage

As a solution for  $\mu$ AXI with extremely high defect coverage, phoenix|x-ray provides its high precision systems micromex and nanomex including the unique x|act software package for fast and easy offline CAD programming. Outstanding precision and repeatability, small views with resolutions of only a few micrometers, 360° rotation and oblique viewing up to 70° ensures meeting highest quality standards - even for inspection of components with a pitch of just 100 microns. Besides automated inspection, x|act ensures an easy pad identification by its live CAD data overlay function even in manual inspection while Flash! Filters™ image optimization ensures high defect coverage.

## Efficient CAD programming

x|act provides not only a minimal setup time compared with conventional view based AXI - once programmed, the inspection program is portable to all x|act compatible systems.

- Easy pad-based offline programming
- Specific inspection strategies for different pad types
- Fully automated inspection program generation
- Extremely high positioning accuracy even at oblique viewing and rotation
- Easy pad identification in manual X-ray inspection
- High reproducibility on large PCBs



Fast and easy programming: just assign the inspection strategies and let x|act generate the automated inspection program

## Virtual board slicing with planarCT

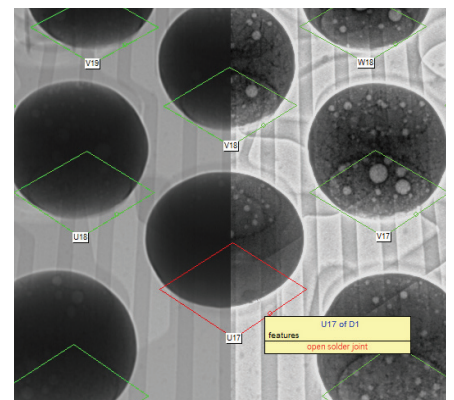
- Easy 2D slice or 3D volume evaluation of large complex boards
- No board cutting, no overlaying structures as in X-ray images



planarCT slice or multislice views allow exact inspection results of a single plane or a whole package

## micro- / nanomex – Your Advantages

- Brilliant live inspection images due to high dynamic GE DXR digital detector array
- Unique high power 180 kV / 20 W submicron or nanofocus\* tube for even high absorbing electronic samples
- Minimized setup time due to highly efficient automated CAD programming
- Live overlay of CAD and inspection results even in rotated oblique inspection views
- Extremely high defect coverage and repeatability
- Detail detectability down to 0.5  $\mu$ m or even 0.2  $\mu$ m
- Optional Flash! Filters™ image optimization technology
- Optional advanced failure analysis with high resolution 3D micro- or nanoCT® or large board planarCT
- Optional 3D CT scans up to 10 seconds



x|act provides live CAD overlay and inspection results in the X-ray live image - at any time, at any viewing angle. GE's exclusive Flash! Filters technology option enables faster, more reliable failure detection (right)

\* Nanofocus 20 W only with diamond window, otherwise 15 W

# Technical Specifications & Configurations



## System magnification and resolution

**Geometric magnification:** DXR max. 1,970 x; max. 2,130 x with image intensifier  
**Total magnification:** DXR max. 2,660 x; max. 22,150 x with image intensifier  
**Detail detectability:** up to 0.5 µm; nanome|x up to 0.2 µm

## 180 kV microfocus or nanofocus X-ray tube

**Type:** Low maintenance open microfocus tube with unlimited lifetime, transmission type, 170° cone angle, collimated  
**Maximal tube voltage:** 180 kV  
**Maximal tube output:** 20W (15 W nanofocus tube without diamond window)  
**Target:** Optional non-toxic diamond|window (tungsten on CVD support) for up to 2 times faster data acquisition at the same high image quality level  
**Filament:** Tungsten hairpin, pre-adjusted in plug-in cartridges for fast and easy exchange

## X-ray detector

**Type:** High dynamic GE DXR250RT, temperature stabilized with active cooling for brilliant live imaging and extremely fast CT data acquisition. (Image intensifier and for nanome|x dual|detector configuration also available.)  
**Pixels:** 1000 x 1000 pixels  
**Resolution (pixel size):** 200 x 200 micrometer  
**Frame grabbing rate:** Up to 30 fps at full frame

## Precise manipulation

**General construction:** high-precision vibration-free synchronised 5-axes manipulation  
**Max. inspection area:** 460 mm x 360 mm (18" x 14")  
610 mm x 510 mm (24" x 20") without rotation table  
**Max. sample size/weight:** 680 mm x 635 mm (27" x 25")/ 10 kg (22 lbs.)  
**ovhm – oblique view at highest magnification :** continuously adjustable view angle up to 70°, rotation 0° - 360°  
**Control:** Joystick or mouse control (manual mode) and CNC (automatic mode)  
**Manipulation aids:** sample X-ray mapping, click'n-move-to function, click'n-zoom-to function, automatic isocentric manipulator movement, laser crosshair  
**Anti-Collision System:** may be deactivated for maximum magnification (tube touching the sample)

## System dimensions

**Dimensions (W x H x D):** 2,020 mm x 1,920 mm x 1,860 mm (79.5" x 75.6" x 73.2"); (D with console: 2,160 mm (85")  
**Min. transportation width:** 1,560 mm (61.4")  
**Weight:** appr. 2,600 kg / 5,732 lbs.

## Radiation Protection

The radiation safety cabinet is a full protective installation without type approval according to the German RöV and the US Performance Standard 21 CFR Subchapter J. For operation, other official licenses may be necessary

## Advanced image processing

**phoenix x|act:** comprehensive CAD based X-ray inspection software comprising image enhancement functions, measuring functions and fast and easy automated CAD based programming for automatic inspection  
**bga|module (standard):** Intuitive automatic view based BGA solder-joint evaluation incl. automatic wetting analysis  
**vc|module (standard):** Intuitive automatic view based voiding calculation software package incl. capability of multiple die attach voiding evaluation

## Software Configuration (Option)

**x|act BGA check strategy:** automated CAD based analysis of BGA solder joints  
**x|act PTH check strategy:** automated CAD based analysis of PTH solder joints  
**qfp|module:** automated QFP solder joint evaluation  
**qfn|module:** automated inspection of QFN / MLF solder joints  
**pth|module:** automated pin-through-hole solder joint evaluation  
**c4|module:** view based evaluation of round solder joints with background structure, such as C4 bumps  
**m|module:** view based registration of multilayer printed circuit boards  
**quality|review:** visual interface for rework and failure indication  
**Flash! Filters™:** GE's exclusive image optimization technology  
**planarCT module:** Non destructive 2D slice and 3D volume board evaluation incl. 3D|viewer software

## Hardware Configuration (Option)

**Tilt/rotate unit:** tilt ± 45° and rotation n x 360° for samples up to 2 kg  
**Manual bar code reader:** for product identification

## Computed Tomography (Option)

**Upgrade package for combined 2D/3D (computed tomography) operation**  
**CT-unit:** precision rotation axis  
**Volume acquisition / reconstruction software:** phoenix datos|x  
**Max. geom. magnification:** 100 x (CT)  
**Max. voxel resolution:** down to 2 µm, resolution depending on the sample size. The nanoCT® function of the nanome|x allows a higher image sharpness.



[www.gemeasurement.com/x-ray](http://www.gemeasurement.com/x-ray)

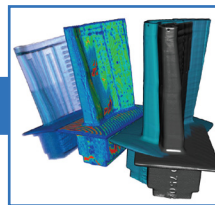


**GE Sensing & Inspection Technologies GmbH**  
phoenix|x-ray  
Niels-Bohr-Str. 7  
D-31515 Wunstorf  
Germany  
Tel.: +49 5031 172 0  
Fax: +49 5031 172 299  
E-mail: phoenix-info@ge.com

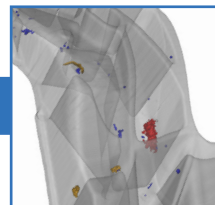
**GE Inspection Technologies, LP**  
50 Industrial Park Rd  
Lewistown, PA 17044  
USA  
Tel.: 717 242 03 27  
Fax: 717-242-2606  
E-mail: phoenix-usa@ge.com

# phoenix v|tome|x m

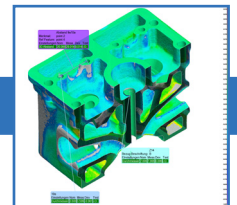
Powerful versatile X-ray microfocus CT system for 3D metrology and analysis with up to 300 kV / 500 W



3D analyses of a scanned turbine blade.



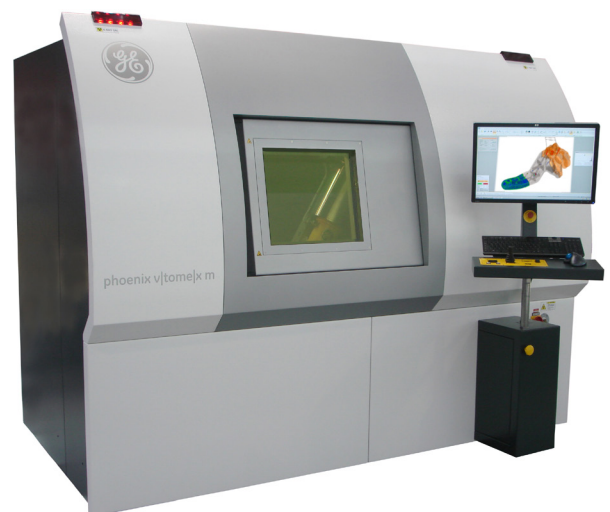
Automatic pore volume analysis in an aluminum casting.



3D measurements and nominal-actual CAD comparison on an aluminum cylinder head.

## Key features & benefits

- scatter|correct: highly improved CT quality level compared to conventional mikrofocus cone beam CT
- Industry leading magnification and power at 300 kV for high absorbing samples on a wide application range
- Unique dual|tube configuration for high power  $\mu$ CT as well as high resolution nanoCT<sup>®</sup>
- First compact 300 kV microfocus CT system with <math>1 \mu\text{m}</math> detail detectability
- metrology|edition for precision measurements with up to  $4+L/100 \mu\text{m}$  referring to VDI 2630 guideline\*
- Max. sample size up to 500 mm  $\varnothing$  x 600 mm in height; 3D scanning area max. 290 mm  $\varnothing$  x 400 mm; up to 50 kg (110 lbs.)



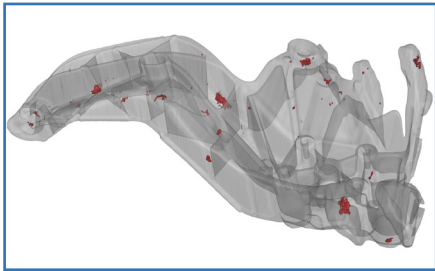


# phoenix v|tome|x m

High-end tool for 3D industrial and scientific analysis tasks

Within the phoenix v|tome|x m, GE's unique 300 kV microfocus X-ray tube is for the first time available in a compact CT system for industrial process control as well as for scientific research applications. Beyond down to  $< 1 \mu\text{m}$  detail detectability, the system offers industry leading magnification and power at 300 kV. GE's high dynamic DXR digital detector array and the click & measure|CT automatization functionality make it an efficient 3D tool for industrial inspection and scientific research. Due to its dual|tube configuration, detailed 3D information for an extremely wide sample range is provided: from high resolution nanoCT® of low absorbing samples up to high power  $\mu\text{CT}$  applications such as turbine blade inspection.

## Industrial non-destructive 3D testing

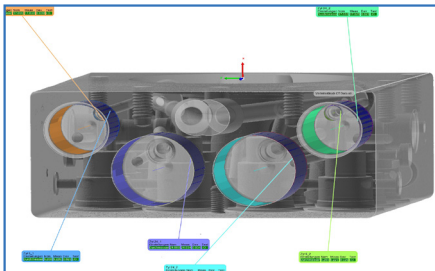


Automated 3D porosity analysis in an automotive control arm

Beyond high-resolution 3D analysis in R&D and failure analysis labs, the phoenix v|tome|x m allows even 3D production control due to its powerful 300kV tube and high dynamic detector technology for fast CT acquisition, fast velo|CT volume reconstruction and its high automation grade. Applications are, e.g., in light metal casting, electronics assembly, plastics molding as well as in turbine blade inspection:

- Internal defect analysis / 3D quantitative porosity analysis
- Assembly control
- Materials structure analysis

## Reproducible precision 3D metrology with CT

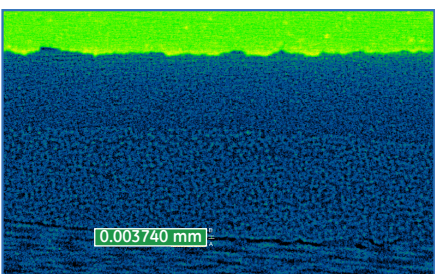


3D metrology of internal features of a valve block made of high grade aircraft aluminum

Especially if complex parts with hidden or difficult accessible surfaces have to be measured, 3D CT offers big advantages in comparison with conventional tactile or optical coordinate measuring machines (CMMs) e.g. for work piece qualification and fast first article inspection. Optimized for long term stability and equipped with its specific 3D metrology package and advanced scatter|correct technology, the phoenix v|tome|x m includes all essential features for CT with extremely high accuracy and reproducibility:

- Accuracy specification of  $4+L/100 \mu\text{m}$  referring to VDI 2630 guideline\*
- Nominal-actual CAD comparison
- Dimensional measurements / wall thickness analysis
- Reverse engineering / tool compensation

## Explore the 3rd dimension of science



nanoCT® of an aluminium plate (green) welded with carbon fibers in polyamide matrix

With its high resolution 180 kV nanoCT® option, the new phoenix v|tome|x m opens a non destructive third dimension for scientific research down to the submicron scale - with no required preparation, slicing, coating or vacuum treatment. Analyze biomedical, materials science, composite, electronics or geological samples with down to  $< 1$  micron voxel size.

Compact CT system with unique dual|tube combination



# phoenix datos|x CT software

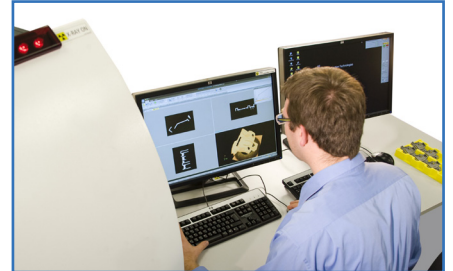
## Fully automated data acquisition and volume processing

With datos|x, the entire CT process chain can be fully automated. Once the appropriate setup is programmed, the whole scan and reconstruction process as well as 3D failure analysis or metrology evaluations like generation of first article inspection reports can be executed automatically.

## Precise, reliable and fast CT results

By using phoenix datos|x CT software, 3D metrology and failure analysis with phoenix|x-ray CT systems becomes as fast and easy as never before.

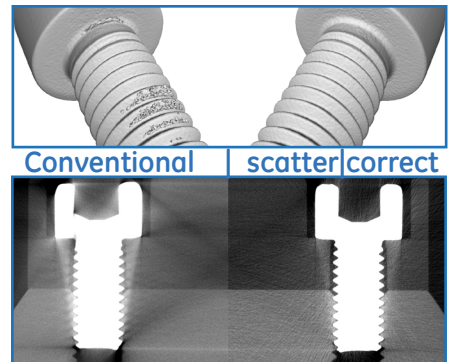
- click & measure|CT: Fully automated data acquisition and volume processing – insert sample, start CT scan, check results
- Reproducible high precision 3D metrology and failure analysis tasks performed with a minimum of operator training
- Significant reduction of required operator time by factor of up to 5
- Wide spectrum of modules for ease of use and accurate CT results



Easy and user friendly CT operation and evaluation.

## Unique scatter|correct technology

GE's breakthrough scatter|correct technology innovation is exclusively available in industrial microCT for the v|tome|x m system. This technological advancement automatically removes scatter artifacts from the CT volume, allowing users to gain significant improved CT results compared to conventional cone beam microCT.



Compared with conventional cone beam CT, scatter|correct significantly improves the result quality of CT

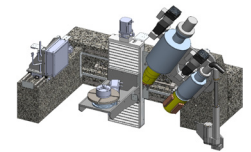
## phoenix v|tome|x m - Your Advantages

- Reduced CT artifacts by up to 300 kV X-ray radiation and advanced, high quality scatter|correct option
- High precision 3D metrology referring to VDI standard 2630 and non destructive testing tasks performed with minimal operator training
- Increased 3D inspection throughput due to high power X-ray tube, efficient, fast detector technology and a high grade of automation
- Very high image quality due to unique GE DXR detector array with an extremely high dynamic range
- All major hardware and CT software components of the system are proprietary GE technology optimally compatible with one another
- Significant reduction of required operator time by using the click & measure|CT functionality
- Stability optimized CT acquisition conditions due to temperature stabilized X-ray tube, digital detector array and cabinet



The unique 300 kV microfocus X-ray tube allows 3D scans even of large or high absorbing work pieces.

# Technical Specifications & Configurations



	phoenix v tome x s	phoenix v tome x m**
X-ray tube type	Open directional high-power microfocus X-ray tube, closed cooling water circuit. Optional additional (open) transmission high power nanofocus X-ray tube	
Max. voltage / power	240 kV / 320 W	300 kV / 500 W. Alternatively available with 240 kV / 320 W microfocus X-ray tube
	Optional additional 180 kV / 15 W in dual tube configuration. Easy tube exchange just by a push of a button	
Geometrical magnification (3D)	1.46 x to 100 x; up to 200 x with nanofocus tube	1.3 x to 100 x at 800 mm FDD (min. sample Ø 2 mm), up to 200 x with nanofocus tube
Detail detectability	Down to < 1 micron (microfocus tube); optional down to < 0.5 micron (nanofocus tube)	
Min. voxel size	Down to 2 microns (microfocus tube)	Down to 1 micron (microfocus tube)
	Optional down to < 1 micron (nanofocus tube)	
Measurement accuracy		4+L/100 µm referring to VDI 2630-1.3 guideline* /**
Detector type (all according US ASTM E2597-07 standard)	Temperature stabilized digital GE DXR detector array, 200 µm pixel size, 1,000 x 1,000 pixels, 200 x 200 mm, extremely high dynamic range > 10000:1, 2x detector enlargement	Temperature stabilized digital GE DXR detector array, 200 µm pixel size, 2000 x 2000 pixels, 400 x 400 mm, extremely high dynamic range > 10000:1
	Optional 400 x 400 mm large 4 MPixel DXR detector (without detector enlargement)	
Manipulation	6-axes metal precision manipulator	Granite based precision 5-axes manipulator (6-axes with detector shift)
Focus-detector-distance	800 mm	800 mm fixed
Max. sample diameter x height	max. 3D scanning size up to 260 mm x 420 mm	360 mm x 600 mm; up to 500 x 600 mm with limited travel range, max. 3D scanning size up to 290 mm x 400 mm
Max. sample weight	max. up to 10 kg (220 lbs.)	High accuracy CT up to 20 kg (44 lbs.); max. up to 50 kg (110 lbs.)
Focus object distance (micro-focus tube)	7 mm to 545 mm	8 mm to 600 mm at FDD 800 (min. sample Ø 2 mm)
System dimensions W x H x D	2,170 mm x 1,690 mm x 1,500 mm (85.4" x 66.5" 59")	2,620 mm x 2,060 mm x 2,980 mm (103" x 81" x 117.3) D 1,570 mm (62") without user panel and generators
System weight (without ext. components)	Appr. 2,900 kg / 6,400 lbs.	Appr. 7,960 kg / 17,550 lbs. (300 kV configuration) Appr. 6,410 kg / 14,150 lbs. (240 kV configuration)
Temperature stabilization	Active X-ray tube cooling   temperature stabilized detector	Active X-ray tube cooling   temperature controlled cabinet   temperature stabilized detector
Optional scatter correct hard-/software bundle (also upgrade option)		CT quality like 2D fan beam CT with minimized scatter radiation artifacts. Max. scan diameter: 260 mm, geom. magnification 1,51x - 100x
Opt. 2D inspection bundle	Tilt and rotation axes for tilted 2D inspection of samples up to 10 kg (22 lbs.)   2D inspection software	
Opt. 3D metrology bundle** (also upgrade option)	High accuracy direct measuring system   2 calibration objects   phoenix datos x CT software package "metrology"	
Opt. nanoCT® bundle	180 kV / 15 W high power nanofocus tube   Precision rotation unit with air bearings   diamond window	
Opt. click&measure CT	Optional fully automated CT process chain	included
Software	phoenix datos x 3D computed tomography acquisition and reconstruction software. Different 3D evaluation software packages for 3D metrology, failure or structure analysis on request	
Radiation protection	The radiation safety cabinet is a full protective installation without type approval according to the German RöV. It complies with French NFC 74 100 and the US Performance Standard 21 CFR Subchapter J. For operation, other official licenses may be necessary.	

\* Measured as deviation of sphere distance in tomographic static mode SD(TS), method details referring to VDI 2630-1.3 guideline on request, valid only for phoenix v|tome|x m metrology edition

\*\* phoenix v|tome|x m metrology|edition only available in specific countries at present, more information on request



**GE Sensing & Inspection Technologies GmbH**  
 phoenix|x-ray  
 Niels-Bohr-Str. 7  
 31515 Wunstorf, Germany  
 Tel.: +49 5031 172 0  
 Fax: +49 5031 172 299  
 E-mail: phoenix-info@ge.com

**GE Inspection Technologies, LP**  
 50 Industrial Park Rd  
 Lewistown, PA 17044, USA  
 Tel.: 717 242 03 27  
 Fax: 717-242-2606  
 E-mail: phoenix-usa@ge.com

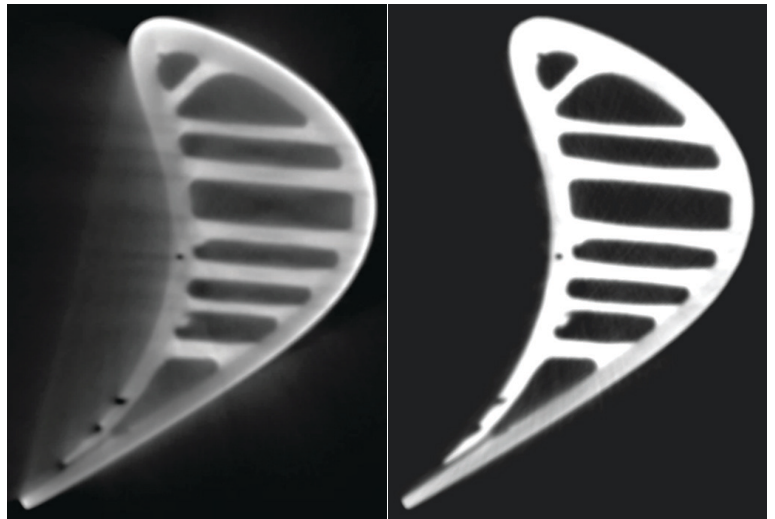
[www.gemeasurement.com/x-ray](http://www.gemeasurement.com/x-ray)

# scatter|correct

Unique tool for high quality scatter reduced industrial CT scans acquired in significantly shorter scan time

## Key features & benefits

- Low artifact high precision performance of fan beam CT combined with up to 100 times faster\* inspection speed of cone beam CT
- Provides significant quality improvement not only for high scattering materials such as steel and aluminium, but also for composites and multi material samples
- Proprietary GE technology - exclusively available as option for the industrial mini- and microCT scanner phoenix v|tome|x c and m as well as upgrade package for installed m systems



\*) While a typical fan beam CT scan of 1000 slices requires 1 minute per slice = 1000 minutes, a cone beam CT scan requires only 10 minutes.

Conventional cone beam CT with scatter radiation artifacts

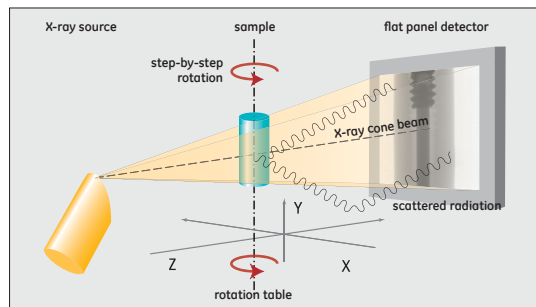
Advanced scatter|correct cone beam CT



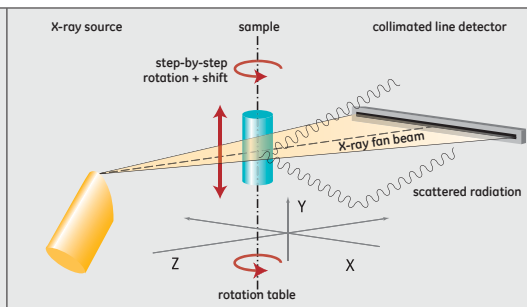
## The problem: scattered radiation decreasing CT speed or quality

At industrial **cone beam CT**, a high dynamic flat panel detector capturing thousands of slices parallel is being used for generating volumetric data of the whole scan part comparatively fast in just one 360° rotation. Until now, X-ray scatter resulting in spurious X-rays meeting the detector array from directions not along the source-detector path **negatively impacts the CT quality**.

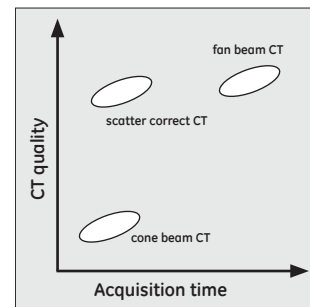
To significantly reduce scattering artifacts at high X-ray energy, **fan beam CT** with collimated line detector arrays has been the ultimate solution for decades. Due to acquiring data for only one CT slice at a time and vertically shifting the sample in the fan beam to repeat the procedure few hundred times, this CT technique **requires hours instead of minutes per CT scan**.



Conventional **cone beam CT** with scattered radiation hitting the detector

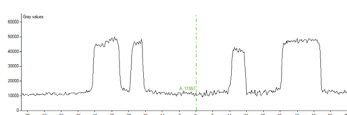


Scatter artifact reduced slice-by-slice **fan beam CT**

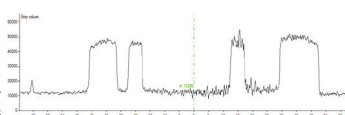


Relation between acquisition time and CT quality

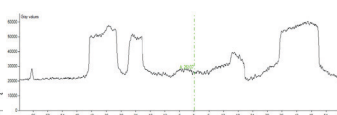
## The solution: scatter|correct for high speed, high quality CT scans



Conventional fan beam CT  
2 hrs. scan time



scatter|correct optimized  
9 min. scan time\*



Conventional cone beam CT  
9 min. scan time

\*) scatter|correct requires one initial correction scan per part type

For industrial process control, excellent CT quality at high sample throughput is evident.

GE's proprietary scatter|correct option is a combination of hard- and software advances allowing users to scan large sample batches in reasonable time as well as significantly reducing scattering artifacts to improve the precision of failure analysis and 3D metrology inspection tasks.

## scatter|correct - Your Advantages

- GE's proprietary scatter|correct functionality allows customers to gain CT quality never before reached with industrial flat panel based cone beam CT
- Combining high precision fan beam CT quality with high throughput of fully automated cone beam CT
- Clearly improved quantitative volume evaluation, e.g. automatic defect recognition or precise 3D metrology of difficult to penetrate multimaterial objects
- Significantly increased inspection productivity allowing CT to migrate from R&D applications to serial inspection on the production floor



[www.ge-mcs.com/x-ray](http://www.ge-mcs.com/x-ray)

GEIT-31352EN (11/15)





DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com



# RA-500

RUGGED CAST ALUMINUM BELT WORN INSTRUMENT  
 MEETS NRC 10 CFR 34.33 PERSONAL MONITORING



BELT LOOP  
 OR CLIP  
 AVAILABLE

**OPTIONS:** FOR USE IN HIGH NOISE AREAS, A SUN-BRIGHT 3,000 mcd LED IS INSTALLED ON TOP OF MONITOR. THE LED FLASHING LIGHT INTENSIFIES WITH RADIATION FIELD; AND/OR AN EARPHONE WITH EAR LOOP & 3 FT PLUG-IN CORD IS AVAILABLE. EXISTING MONITORS MAY BE RETROFITTED WITH THESE OPTIONS.



DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com

# RA-500

RUGGED CAST ALUMINUM BELT WORN INSTRUMENT  
 MEETS NRC 10 CFR 34.33 PERSONAL MONITORING

## FEATURES:

- DETECTS GAMMA AND X-RAY
- SYSTEM TEST INCLUDES BATTERY AND ALARM TEST
- ALARM OUTPUT IS 100 DECIBELS AT SIX INCHES
- RECESSED AND GUARD PROTECTED CONTROLS PROVIDE ADDITIONAL SAFETY MEASURES, PREVENTING ACCIDENTAL TURN-OFF WHEN IN USE AND PROVIDES DAMAGE PROTECTION
- EASY OPERATION, NO WARM UP TIME REQUIRED
- USES ONE 9 VOLT BATTERY
- EACH UNIT CALIBRATED AT FACTORY AND CERTIFIED FOR ONE YEAR
- OPTIONAL LED AND/OR EARPHONE FOR LOUD NOISE SITUATIONS

## SPECIFICATIONS

ENERGY RESPONSE.....GAMMA AND X-RAY FROM 80-1500 KeV, +/-20%

EXPOSURE RATE LIMIT.....IN EXCESS OF 1000 R/hr

ALARM OUTPUT.....SOLID STATE AUDIO-TONE TRANSDUCER EMITS 100 DB AT 6 INCHES.  
 AUDIO STARTS TO ACTIVATE AT 450 mR/hr EMITTING A LOUD CRACKLING SOUND. AS THE FIELD INTENSIFIES, THE ALARM BECOMES A SOLID TONE. ACCURACY IS +/- 20%

ENVIRONMENTAL EFFECTS.....HUMIDITY LIMITS: 0-99% NON-CONDENSING

TEMPERATURE LIMITS.....-30 DEGREES C to +50 DEGREES C (EXCLUDING BATTERY)

DETECTOR.....HALOGEN QUENCHED GEIGER MUELLER TUBE  
 EFFECTIVE LENGTH AND DIAMETER: 0.625 INCH x 0.194 INCH  
 WALL THICKNESS: 90 mg/cm SQUARED

CONTROLS.....ON/OFF SWITCH; BATTERY INDICATOR LIGHT;  
 AND BATTERY/AUDIO CHECK SWITCH

CALIBRATION CONTROLS.....A SINGLE 24 TURN POTENTIOMETER LOCATED NEAR BATTERY

CALIBRATION PRECISION.....WITHIN 10% WHEN CALIBRATED WITH Cs-137

BATTERY COMPLEMENT.....ONE 9 VOLT (NON-ALKALINE) EVEREADY OR EQUIVALENT INCLUDED

BATTERY LIFE.....APPROXIMATELY 6 MONTHS IN NORMAL USE. BATTERY LIFE IS SHORT-ENED WHEN ALARM IS ACTIVATED. FULL LOAD AT 500 mR/hr WITH CONSTANT ALARM, BATTERY LIFE IS 50 HOURS (ALKALINE).

DIMENSIONS.....2.5" WIDE x 4.25" LONG x 1.25" DEEP (EXCLUDING BELT LOOP)

WEIGHT.....8 OUNCES (INCLUDING BATTERY)



DETEK, Inc.  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com

**ND-15**

**RUGGED CAST ALUMINUM BELT WORN INSTRUMENT  
DUAL-RANGE CONTINUOUS WARNING PERSONAL MONITOR**



**BELT LOOP  
OR CLIP  
AVAILABLE**

**OPTIONS: FOR USE IN HIGH NOISE AREAS, A SUN-BRIGHT 3,000 mcd LED IS INSTALLED ON TOP OF MONITOR. THE LED FLASHING LIGHT INTENSIFIES WITH RADIATION FIELD; AND/OR AN EARPHONE WITH EAR LOOP & 3 FT PLUG-IN CORD IS AVAILABLE. EXISTING MONITORS MAY BE RETROFITTED WITH THESE OPTIONS.**





DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com

**ND-15**

**RUGGED CAST ALUMINUM BELT WORN INSTRUMENT  
 DUAL-RANGE CONTINUOUS WARNING PERSONAL MONITOR**

**FEATURES:**

- DETECTS GAMMA AND X-RAY
- EMITS A SHORT CONSTANT-PITCH "CHIRP" WHICH VARIES FREQUENCY WHEN RADIATION INTENSIFIES
- DUAL-RANGE WITH HIGH/LOW SWITCH SETTINGS:  
 HIGH RANGE PRODUCES 60 CHIRPS PER MINUTE IN A 30 mR/hr FIELD, SOLID TONE @ 500 mR  
 LOW RANGE PRODUCES 60 CHIRPS PER MINUTE IN A 1 mR/hr FIELD, SOLID TONE @ 15 mR
- ALARM OUTPUT IS 100 DECIBLES AT SIX INCHES
- EASY OPERATION, NO WARM UP TIME REQUIRED
- USES ONE 9 VOLT BATTERY
- OPTIONAL LED AND/OR EARPHONE

**SPECIFICATIONS**

ENERGY RESPONSE.....GAMMA AND X-RAY FROM 80-1500 KeV, +/- 20%

EXPOSURE RATE LIMIT.....IN EXCESS OF 1000 R/hr

ALARM OUTPUT.....SOLID STATE AUDIO-TONE TRANSDUCER EMITS 100 DB AT 6 INCHES.  
 AUDIO EMITS A SHORT, CONSTANT CHIRPING NOISE WHICH BECOMES  
 A SOLID TONE AS RADIATION INTENSIFIES. ACCURACY IS +/- 20%

ENVIRONMENTAL EFFECTS.....HUMIDITY LIMITS: 0-99% NON-CONDENSING

TEMPERATURE LIMITS.....-30 DEGREES C to +50 DEGREES C (EXCLUDING BATTERY)

DETECTOR.....HALOGEN QUENCHED GEIGER MUELLER TUBE  
 EFFECTIVE LENGTH AND DIAMETER: 0.625 INCH x 0.194 INCH  
 WALL THICKNESS: 90 mg/cm SQUARED

CONTROLS.....ON/OFF AND HIGH/LOW SWITCHES  
 LOW RANGE: 60 CHIRPS PER MINUTE IN A 1 mR/hr FIELD  
 HIGH RANGE: 60 CHIRPS PER MINUTE IN A 30 mR/hr FIELD

CALIBRATION CONTROLS.....NONE, FACTORY SET

CALIBRATION PRECISION.....WITHIN 10% WHEN CALIBRATED WITH Cs-137

BATTERY COMPLEMENT.....ONE 9 VOLT (NON-ALKALINE) EVEREADY OR EQUIVALENT IS INCLUDED

BATTERY LIFE.....APPROXIMATELY 6 MONTHS IN NORMAL USE. BATTERY LIFE IS SHORT-  
 ENED WHEN ALARM IS ACTIVATED. FULL LOAD AT 500 mR/hr WITH  
 CONSTANT ALARM, BATTERY LIFE IS 50 HOURS (ALKALINE)

DIMENSIONS.....2.5" WIDE x 4.25" LONG x 1.25" DEEP (EXCLUDING BELT LOOP)

WEIGHT.....8.5 OUNCES/241 GRAMS (INCLUDING BATTERY)



# THE SENTRY EC

RADIATION ALERT® PERSONAL ALARMING  
RATE METER & DOSIMETER

y x



The Radiation Alert® Sentry EC is a Personal Alarming Dosimeter / Ratemeter designed to ensure the safety of personnel that work in occupations with potential x-ray or gamma exposure.

The pocket sized unit has an energy compensated tube for a linear response to gamma and built in memory for recording data points for tracking accumulated exposure. The SentryCom Software option enables you to generate incident reconstruction for analysis. The software also permits you to easily set the vibrating and audio alert to your desired levels for dose and dose rate.

Use the audio switch to choose between audible clicks with each count recieved or a discreet silent mode.

## Detector

Energy Compensated GM Tube

## Dose Rate Linearity

Better than  $\pm 15\%$  up to 15 R

## Energy Response

Down to 20 KeV

## Accuracy

Typically  $\pm 15\%$  of reading ( $Cs^{137}$ )

## Gamma Sensitivity

1.5 cps/mR/hr ( $Co^{60}$ )

## Switch Functions

Power, Vibrate & Audible Alert, Silent Vibrating Only Alert, and Audio Clicks On/Off

## Operating Range

Dose Rate: 0.1 - 15 R/hr

Accumulated Dose: 0.1 - 65 R

## Audible Alarms

Accumulated Dose & Dose Rate, 90db @ 1 ft.

## Alarm Thresholds

Default: Dose 500 mR/Rate 50 mR/hr

## Sievert Option:

Dose 5000  $\mu$ Sv/Rate 500  $\mu$ Sv/hr

Alarm and warning levels are user selectable with the optional SentryCom Software.

## Power Requirements

9-Volt Alkaline Battery. Approx. 1500 hrs. at normal background.

## Enclosure

Alodized Aluminum Housing w/ Metal Belt Clip

## Outputs

Mini-USB



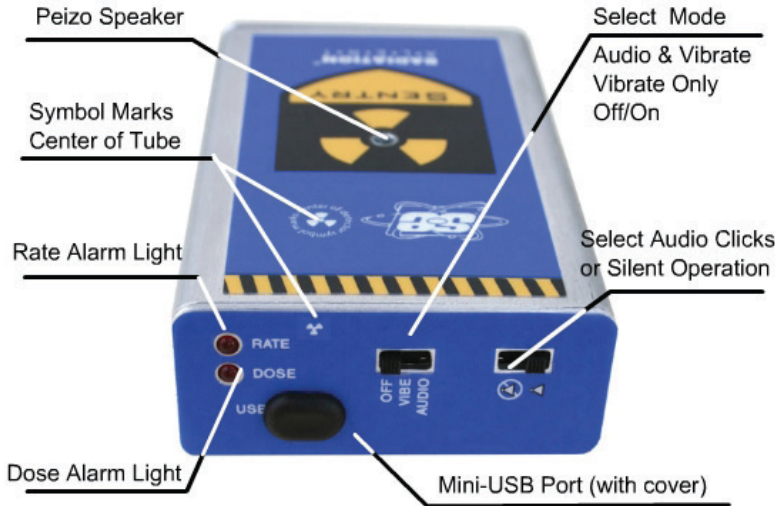
## DETEK, Inc.

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com

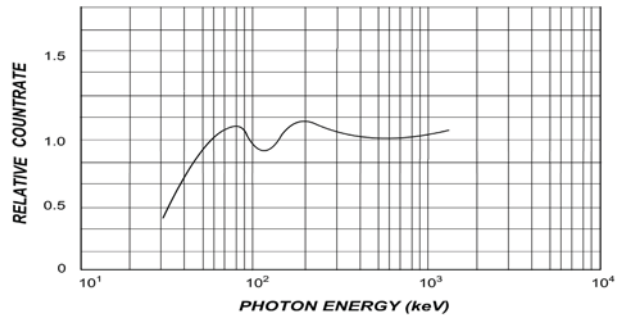
# THE SENTRY EC

RADIATION ALERT ® PERSONAL ALARMING RATE METER & DOSIMETER



The rugged Alodized Aluminum Housing protects the unit in tough industrial environments

Sentry USB Energy Compensated GM Energy Response



## Temperature Range

-20° - + 50°C (-4° - +122°F)

## Weight

228 g (8 oz)

## Size

106 x 67 x 28 mm (4.2 X 2.7 X 1.1 in)

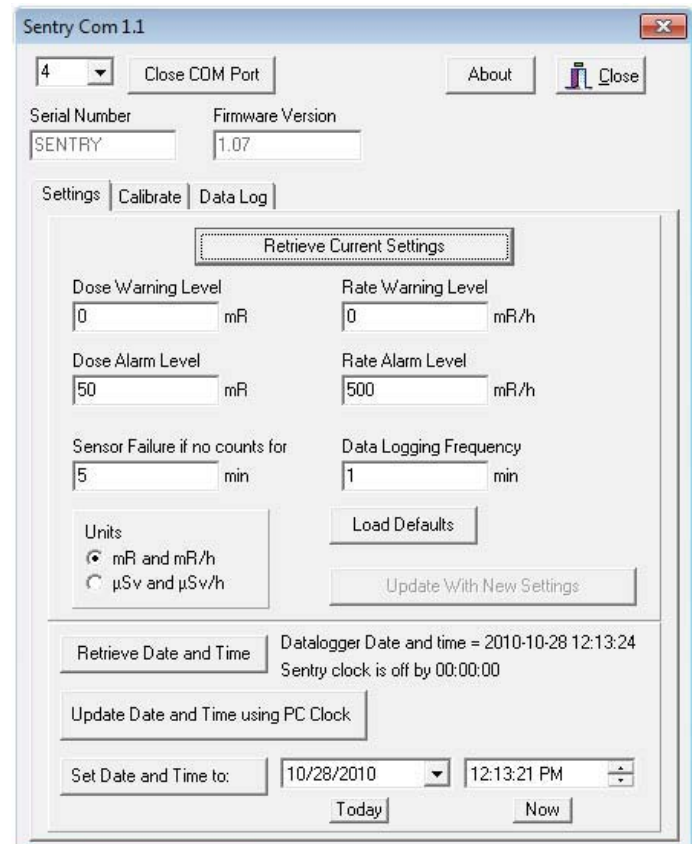
## Limited Warranty

1 year limited

## SentryCom Software

The optional SentryCom Software enables you to easily integrate The Sentry into your radiation safety program by allowing you to select the thresholds for dose and dose rate alarms/warnings. You can set the Cal Factor, and the data logging frequency, and download the accumulated dose data as a text file. The report includes a delimited time and date stamp, exposure, and power cycle identifiers for easy recording and incident analysis in most spreadsheet programs. Units of measurement can be changed between mR/hr and  $\mu$ Sv/hr to fit your application and reporting needs.

The SentryCom Software comes complete with mini-USB cable.



## DETEK, Inc.

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com



# RAD-60

## Alarming Personal Dosimeter



The RADOS RAD-60 Personal Alarm Dosimeter is a precise and reliable instrument for ensuring the personal safety of the user. Ideally, the RAD-60 is used in everyday radiation monitoring, in stand-alone conditions. If your needs grow for a more sophisticated system, the RAD-60 can also be integrated into an Access Control System. The RAD-60 can be switched into System Mode, for the purpose of tracking Personnel Dose records and compliance reports.

### Detector

Energy compensated Si-Diode

### Button Functions

- change display (dose/dose rate)
- switch ON/OFF
- chirp ON/OFF
- reset integrated dose
- change alarm thresholds
- activate battery test

### Measurement Range

Dose: 1  $\mu$ Sv - 9.99 Sv or 0.1 mrem - 999 rem

### Energy Response

Hp(10), 60 keV - 3 MeV, better than + or - 25%, up to 6 MeV, better than + or - 35%

### Dose Rate

5  $\mu$ Sv/h - 3 Sv/h or 0.5 mrem/h - 300 rem/h

### Dose Rate Linearity

Better than + or - 15% up to 3 Sv/h (300 rem/h)

### Calibration

Better than + or - 5% (Cs-137, 662 keV at 2 mSv/h), Hp(10)

### Audible Alarms

Seven separate alarms, sound level typically better than 85 dBA at 30 cm

- integrated dose
- dose rate
- dose overflow
- dose rate overflow at 3 Sv/h or 300 rem/h
- low battery 1 and 2
- defect

### Alarm Thresholds

Six preset values each for integrated dose and dose rate-push button selection

### Connectors

Infrared communication via bottom of the dosimeter

### Power Requirements

One triple A alkaline cell, typical life is 1800 hours in background

### Temperature Range

-20 - + 50° C operational, humidity up to 90% RH, non-condensed

-20 - + 70° C storing

### Weight

80 g (including battery)

### Size

78 x 67 x 22 mm



## DETEK, Inc

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

301-449-7300 FAX 301-449-7011

www.detek.com email: sales@detek.com



**RADIATION**  
**A•L•E•R•T**  
QUALITY HANDHELD DETECTORS

®

# Pen Dosimeters

$\gamma$  X 

*The advanced direct reading dosimeters are rugged, precision instruments. They are higher quality and have greater reliability than other dosimeters of this type. They measure and directly read, at any time, accumulated dose (quantity of gamma and x-ray exposure). PEN dosimeters are designed to satisfy military specifications for the RADIAC METER IM-264/PD and ANSI N 13.5 and N322 requirements. A sturdy metal clip attaches the dosimeter to a pocket or any object to monitor total radiation exposure. They are hermetically sealed and immersion proof.*



## Exposure Range (gamma and x-rays)

PEN200mR Scale increments of 10mR  
PEN500mR Scale increments of 20mR  
PEN2R increments of 100 mR  
PEN5R increments of 200mR  
PEN20R increments of 1R  
PEN2mSv increments of .1mSv  
PEN5mSv increments of .2mSv  
National Stock Numbers Available

## Energy Dependence

$\pm 10\%$  maximum change in sensitivity for x and gamma ray energies from 16 keV to 8 MeV.

## Electrical Leakage

In the absence of radiation, the dosimeters leakage or self discharge is less than 0.5% of full scale in 24 hours at 50° C. At 20° C dosimeters will read background radiation. After gross over exposure totaling up to 2000 R the leakage is less than 5% of full scale in 48 hours at 20° C. Thereafter, the leakage will decrease to original values.

## Charging Voltage

Dosimeters are capable of being charged to "zero" with 140 to 195 volts.

## Accuracy

$\pm 10\%$  of true dose for Cs-137 or Co-60 gamma.

## Enclosure Material

Barrel - carbon fiber-filled, high-strength, electrically-conducting plastic with metal clip.

## Weight

Approx. 19 grams (0.7 oz.)

## Size

PEN- 200, 500, 2mSv, 5mSv Length: 11 cm (4.48 in)

Diameter: 1.5 cm (0.6 inches)

PEN- 2, 5, 20 Length: 11.5 cm (4.52 in)

Diameter: 1.5 cm (0.6 in)

## Options

Protective sapphire lens

## Warranty

2 yr limited warranty



Dosimeter  
Charger



**RADIATION**<sup>®</sup>  
**A · L · E · R · T**  
QUALITY HANDHELD DETECTORS



**DETEK, Inc**

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

301-449-7300

FAX 301-449-7011

www.detek.com

email: sales@detek.co



# The Charger

**Piezo Powered Dosimeter Charger**



The patented, handheld Charger can charge a variety of direct-reading dosimeters by simply squeezing the lever of a generator. The Charger requires no batteries. By pulling a trigger, a dosimeter is easily placed in or removed from the charger. The clamping action holds the dosimeter for you. NSN# 6665-00-856-8813 - CD V-750 Model 6

## **Power**

15,000 volt piezoelectric generator.

## **Discharge Bulb**

Flashes to indicate the instrument is operational.

## **Clamping Mechanism**

Spring loaded, adjustable and self locking. All metal parts are stainless steel.

## **Temperature Range**

-20° to +50°C (-4° to +122°F).

## **Humidity Range**

0 to 90% Relative Humidity.

## **Weight**

243 g (8.6 oz.).

## **Size**

152 x 108 x 22 mm (6 x 4.2 x .87 in.)

## **Limited Warranty**

1 year limited warranty.



## **DETEK, Inc.**

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com



DETEK, Inc.

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com



# ND-100

## DIRECT READING DOSIMETER CHARGER





DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com

# ND-100L & ND-100

DIRECT READING DOSIMETER CHARGERS

## FEATURES:

- DURABLE DIE CAST ALUMINUM CASE WITH FOUR RUBBER FEET
- DOSIMETER CHARGERS HAVE A SAFETY SPRING IN CHARGING SOCKET PREVENTING DAMAGE TO DOSIMETER IF EXCESSIVE PRESSURE IS USED WHEN CHARGING
- THE ND-100 CHARGER USES A BRIGHT 2.47V BULB THEREBY ENABLING A BETTER VIEW OF THE DOSIMETER SCALE
- MODEL ND-100L OFFERS A BRIGHT L.E.D. SOURCE RATHER THAN THE ABOVE BULB. NEVER CHANGE A BULB AGAIN WITH A LIFE OVER 100,000 HOURS. THIS MODEL OPERATES ON ONLY 2 "AA" CELL 1.5V BATTERIES (ALK OR CARBON ZINC).
- DOSIMETER CHARGERS ARE COMPATIBLE WITH ALL DOSIMETERS MANUFACTURED.
- MODEL ND-100 USES 2 "C" CELL BATTERIES, ALKALINE ONLY.

## SPECIFICATIONS

- VOLTAGE.....100 to 300 VOLTS
- CONTROLS.....NO OFF/ON SWITCH; POWER ACTIVATED BY CONTACT WITH DOSIMETER. POWER CONTROL POTENTIOMETER ADJUSTS THE DOSIMETER HAIRLINE
- TEMPERATURE LIMITS.....-30 DEGREES C TO +50 DEGREES C (EXCLUDING BATTERIES)
- ENVIRONMENTAL EFFECTS.....HUMIDITY LIMITS: 0-99% NON-CONDENSING
- BATTERY COMPLEMENT.....2 "C" CELL 1.5V EVEREADY OR EQUIVALENT INCLUDED DO NOT USE ALKALINE BATTERIES
- BATTERY LIFE.....CAPABLE OF RECHARGING DOSIMETERS THOUSANDS OF TIMES BEFORE REPLACEMENT IS NECESSARY
- DIMENSIONS.....4.6 INCHES LONG x 3.6 INCHES WIDE x 3.4 INCHES HIGH (INCLUDES RUBBER FEET)
- WEIGHT.....1 POUNDS, 3 OUNCES/ 539 GRAMS (INCLUDING BATTERIES)



# Pressurized $\mu$ R Ion Chamber Survey Meter

Victoreen® Model 451P



## Introduction

The Model 451P state-of-the-art ion chamber survey meter is a hand-held battery operated unit designed for use in both rugged and normal environments. The Model 451P features a pressurized ionization chamber, providing enhanced sensitivity and improving energy response to measure gamma and x-ray radiation. The Model 451P employs microprocessor and LCD technology. The ergonomic handle, features a large diameter cushioned grip and is designed to reduce fatigue associated with extended use. The case is constructed of lightweight, high strength materials and is sealed against moisture. The user must specify R or Sv when ordering.

The display features an analog bar graph, 2.5 digit digital readout, low battery and freeze mode indicators. User controls consist of an ON/OFF button and a MODE button. The unit is auto-zeroing and auto-ranging. The display features circuitry that automatically activates the backlight in low ambient light conditions.

The RS-232 interface can be connected directly to a computer for use with the Excel add-in for Windows, enhancing the functionality of the instrument. The software allows for data retrieval, user parameter selection and provides a virtual instrument display with audible (requires sound card) and visual alarm indication. The software may be customized by the user for specific applications.

## Applications

The Model 451P is used in a wide range of medical and health physics applications. The Model 451P was designed to measure leakage and scatter around diagnostic x-ray and radiation therapy suites. Also, the Model 451P is ideal for site surveys and is regularly used by x-ray manufacturers, government agencies, state inspectors, research labs, biomedical technicians, and in airports for baggage inspection equipment maintenance.

RS

Radiation Safety

- High sensitivity  $\mu$ R measurements of exposure and exposure rate
- Available with dose equivalent energy response (SI units)
- Fast response to measure radiation from leakage, scatter beams and pinholes
- Ergonomic, anti-fatigue handle with replaceable grip and wrist strap
- Excel add-in for Windows® for data logging and selection of instrument operating parameters (optional)
- Low noise chamber bias supply for fast background reading
- Bright, highly visible colors
- Easy touch keys

## Features

- Ideal for a wide range of applications including NDT, x-ray, and environmental
- Battery operated
- Auto-ranging and auto-zeroing
- RS-232 communications interface
- Measures rate and dose simultaneously
- Tripod mount for stationary, area monitor applications
- Freeze mode indicates peak reading
- Programmable flashing display
- Automatic, ultra-bright LCD display
- Separate integrate mode
- Excel add-in for Windows (optional)



## DETEK, Inc

6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
301-449-7300 FAX 301-449-7011  
www.detek.com email: sales@detek.com



## Specifications

**Radiation detected** Beta above 1 MeV, Gamma and x-rays above 25 keV

### Operating ranges

0 to 500 $\mu$ R/h	or	0 to 5 $\mu$ Sv/h
0 to 5 mR/h	or	0 to 50 $\mu$ Sv/h
0 to 50 mR/h	or	0 to 500 $\mu$ Sv/h
0 to 500 mR/h	or	0 to 5 mSv/h
0 to 5 R/h	or	0 to 50 mSv/h

**Accuracy** Within 10% of reading between 10% and 100% of full scale indication on any range, exclusive of energy response. Calibration source is  $^{137}\text{Cs}$

**Detector Chamber:** 300 cc volume pressurized air ionization chamber to 8 atmospheres or 125 psi

**Controls** ON/OFF and MODE

**Automatic features** Auto-zeroing, auto-ranging, and auto-backlight

**Response time** Analog response time from 10% to 90% of reading for a full scale step increase is dependent on operating range. Response time for a step increase in radiation exposure rate from background:

Step increase, background to	Time to reach 90% of final value
400 $\mu$ R/h	4.8 sec
4 mR/h	3.3 sec
10 mR/h	4.3 sec
40 mR/h	4.5 sec
100 mR/h	2.7 sec
1 R/h	2 sec
4 R/h	2.7 sec

The following table shows time measured from 10% to 90% of final value for a step increase or decrease in exposure rate such that a range change does not occur. These values are the response times for the various ranges:

Range	10% to 90%
0 to 500 $\mu$ R/h (5 $\mu$ Sv/h)	5 sec
0 to 5 mR/h (50 $\mu$ Sv/h)	2 sec
0 to 50 mR/h (500 $\mu$ Sv/h)	1.8 sec
0 to 500 mR/h (5 mSv/h)	1.8 sec
0 to 5 R/h (50 mSv/h)	1.8 sec

**Power requirements** Two 9 V alkaline, 200 hours operation

**Warm-up time** Less than two minutes for initial operation when the instrument is in equilibrium with ambient temperature

### Display LCD analog/digital with backlight

**Analog** 100 element bar graph 2.5 inch (6.4 cm) long. Bar graph is divided into five major segments, each labeled with the appropriate value for the range of the instrument

**Digital** 2.5 digit display is followed by a significant zero digit depending on the operating range of the instrument. The units of measurement are indicated on the display at all times. Digits are 0.25 inches (6.4 mm) high. Low battery and freeze indicators are also provided on the display

## Modes

**Integrate mode** Operates continuously 30 seconds after the instrument has been turned on. Integration is performed even if the instrument is displaying in mR/h or R/h

**Freeze mode** Will place a tick mark on the bar graph display to hold on the peak displayed value. The unit will continue to read and display current radiation values

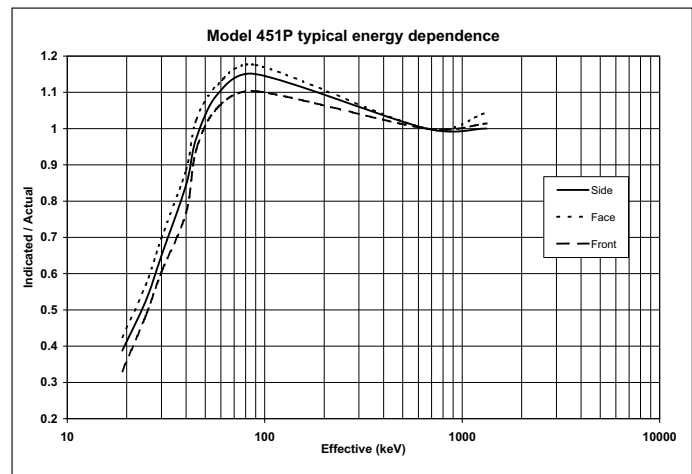
## Environmental

**Temperature range** - 4° to + 122°F (- 20° to + 50°C)

**Relative humidity** 0 to 100%

**Geotropism** Negligible

**Typical energy dependence**  $^{16}\text{Nitrogen}$  gamma rays are 110% to 120% of indicated readings as determined at the University of Lowell



**Dimensions** 4 (w) x 8 (d) x 6 in (h) (10 x 20 x 15 cm)

**Weight** 2.4 lb (1.07 kg)

### Optional accessories

**451 Assistant for Excel** (Model 451EXL), includes RS-232 interface cable

**Single Unit Carrying Case** (Model 190HPS)

**Check Source,  $^{137}\text{Cs}$ , 10  $\mu$ Ci. Flat disc, 1 inch diameter** (Model 62-103)

### Available model(s)

**451P-RYR** Pressurized  $\mu$ R Ion Chamber Survey Meter with standard chamber

**451P-DE-SI-RYR** Pressurized  $\mu$ R Ion Chamber Survey Meter with dose equivalent chamber

**CE Tested. Meets applicable standards.**

For more information, receive our full product catalog, or order online, contact **Radiation Management Services** business of **Fluke Biomedical**: 440.248.9300 or [www.flukebiomedical.com/rms](http://www.flukebiomedical.com/rms).

*Specifications are subject to change without notice.*

©2005 Fluke Biomedical. All rights reserved. Victoreen is a trademark of Fluke Corporation. Windows is a trademark of Microsoft Corporation. Printed in USA.  
451P-ds rev 5 15 jun 05



# DETEK, Inc

6805 Coolridge Drive  
Temple Hills, MD 20748-6940

301-449-7300 FAX 301-449-7011  
[www.detek.com](http://www.detek.com) email: [sales@detek.com](mailto:sales@detek.com)



DETEK, Inc.  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
800-638-0554 FAX 301-449-7011  
www.detek.com sales@detek.com



# ND-2000

3 RANGE, 0-1000 MR/HR  
WATERPROOF RADIOGRAPHIC SURVEY METER





DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com

# ND-2000

3 RANGE, 0-1000 MR/HR  
 WATERPROOF RADIOGRAPHIC SURVEY METER

## FEATURES:

- DETECTS GAMMA AND X-RAY
- RUGGED, WATERPROOF, DUSTPROOF, NYLON REINFORCED FIBERGLASS CASE
- DROP TESTED FROM A DISTANCE OF 1 METER (ONTO CONCRETE) IN EXCESS OF 20 TIMES WITH NO DAMAGE OR FAILURES.
- BATTERY/HIGH VOLTAGE TEST POSITION ON RANGE SWITCH
- LARGE, RUGGEDIZED, METAL, 3.5 INCH METER INDICATOR
- USES 2 "D" CELL BATTERIES PROVIDING OVER 300 HRS OF CONTINUOUS USE (ALKALINE)
- FULLY TRANSISTORIZED
- REGULATED HIGH AND LOW VOLTAGE
- OPTIONAL AUDIBLE SPEAKER WITH OFF-ON SWITCH FOR AURAL MONITORING (ND-2000A)
- OPTIONAL GAMMA REMOTE PROBE WITH CABLE AVAILABLE (ND-2000P)

## SPECIFICATIONS

RANGES - DUAL SCALE.....	0 - 1000, 0 - 100, 0 - 10 mR/hr 0-10,000; 0-1,000; 0-100 uSv/hr
EFFICIENCY.....	WITHIN 10% OF FULL SCALE AT STANDARD TEMPERATURE OVER OPERATING RANGE
ENERGY RESPONSE.....	GAMMA AND X-RAY FROM 80-1500 KeV, +/- 20%
SATURATION.....	IN EXCESS OF 1000 R/HR WHEN CALIBRATED AND PROPERLY MAINTAINED
ENVIRONMENTAL EFFECTS.....	HUMIDITY LIMITS: 0-99% NON-CONDENSING
TEMPERATURE LIMITS.....	-30 DEGREES C to +50 DEGREES C (EXCLUDING BATTERIES)
DETECTOR.....	HALOGEN QUENCHED, ENERGY COMPENSATED GEIGER MUELLER TUBE EFFECTIVE LENGTH AND DIAMETER: 0.625 INCH x 0.194 INCH WALL THICKNESS: 90 mg/cm SQUARED
CONTROLS.....	5 POSITION ROTARY RANGE SWITCH: OFF; X-100; X-10; X-1; and BATTERY/HIGH VOLTAGE TEST
CALIBRATION CONTROLS.....	INDIVIDUAL POTENTIOMETERS FOR ADJUSTMENT OF EACH RANGE
CALIBRATION PRECISION.....	WITHIN 10% WHEN CALIBRATED WITH Cs-137
RESPONSE TIME.....	90% OF FINAL READING WITHIN 10 SECONDS
GEOTROPISIM.....	WITHIN 2% OF FULL SCALE IN ANY ORIENTATION
DIMENSIONS.....	4.4 INCHES WIDE x 7.75 INCHES LONG x 6.25 INCHES HIGH (INCLUDES HANDLE)
WEIGHT.....	3 POUNDS, 13 OUNCES/1.73 KILOGRAMS (INCLUDING BATTERIES)



# Monitor 4 & 4EC

OPTIONAL MINI-USB WITH OBSERVER SOFTWARE AVAILABLE

a  $\beta$  y x



The M4 and M4EC are compact, ergonomic, general purpose survey meters capable of detecting alpha, beta, gamma, and x-rays over 3 selectable ranges. A red count light flashes and a beep sounds with each event detected. The Monitor 4EC offers a more linear reading for gamma and x-rays (above 40 keV).

## Detector

*Monitor 4:* Halogen-quenched uncompensated GM tube with thin mica window 1.5-2.0 mg/cm<sup>2</sup> thick.

*Monitor 4EC:* Halogen-quenched GM tube, energy compensated sidewall 2mm tin filter. Thin mica window 1.5-2.0 mg/cm<sup>2</sup> thick.

## Energy Sensitivity

1000 CPM/mR/hr (Cs<sup>137</sup>). 4EC is the same as M4 except the energy response for gamma and x-rays through the detector sidewall is flat within +61% or -26% over the range of 40 keV to 100 keV, and within +35% or -17% over the range of 100 keV to 1.3 MeV.

## Operating Range

0-.5, 0-5, 0-50 mR/hr

0-500, 0-5,000, 0-50,000 CPM or

0-5, 0-50, 0-500  $\mu$ Sv/hr (SI Scale Meter Option)

## Accuracy

Typically  $\pm 15\%$  of reading (Cs<sup>137</sup>)

## Display

Analog Meter holds full scale in fields as high as 100X maximum reading. CPM & mR/hr scale. Optional SI Scale Meter Available



M4 with CPM & mR/hr meter scale



## DETEK, Inc.

6805 Coolridge Drive

Temple Hills, MD 20748-6940

800-638-0554 FAX 301-449-7011

www.detek.com sales@detek.com



# Monitor 4 & 4EC

OPTIONAL MINI-USB WITH OBSERVER  
SOFTWARE AVAILABLE

## Audio Indicator

Internally mounted beeper

## Power Requirements

9-volt alkaline approx. to 2,000 hrs at background

## Temperature Range

-20° to 55°C (-4° to 131°F).

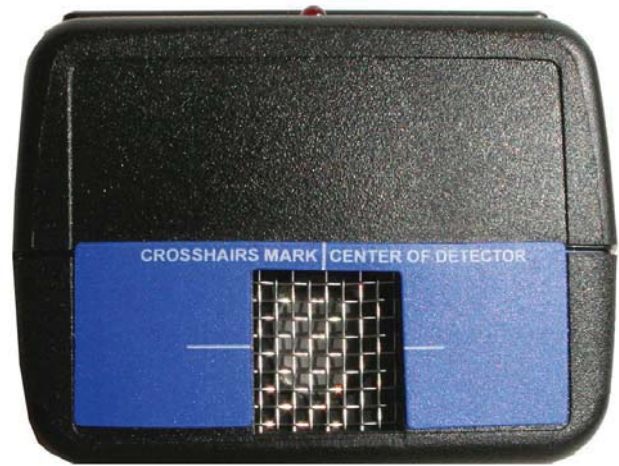
## Weight

M4: 200 g (7.1 oz)

M4EC: 224 g (7.9 oz)

## Outputs

Dual miniature jack drives CMOS or TTL devices: count to computer or datalogger. Submini jack input allows for electronic calibration. USB versions of the M4 and M4EC have a mini-USB jack for use with the USB Observer Software.



The end window of the M4 and M4EC

## Size

209 x 71 x 50 mm (8.2 x 2.8 x 1.9 in.)

## Includes

Carrying Case w/ Belt Clip

## Options

SI Meter Option, Observer Software, Mini-USB Option with USB Observer Software

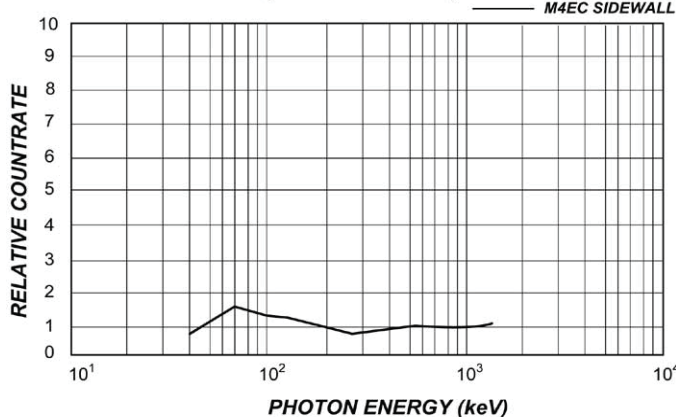
## Limited Warranty

1 year limited warranty

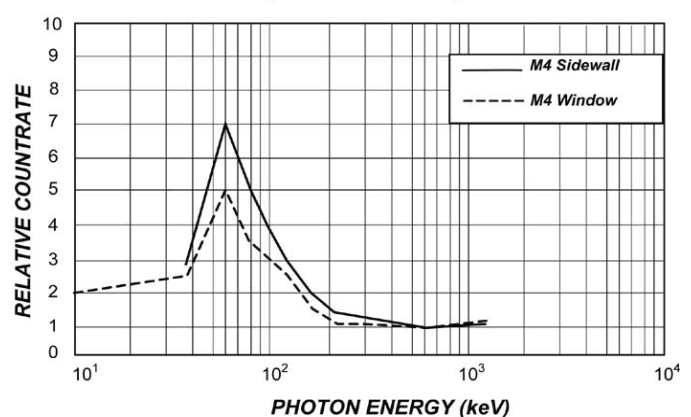


Optional SI Meter Scale: 0-500 µSv/hr & 0-50 mR/hr

ENERGY RESPONSE  
(Relative to Cs-137)



ENERGY RESPONSE  
(Relative to Cs-137)



DETEK, Inc.

6805 Coolridge Drive

Temple Hills, MD 20748-6940

800-638-0554

FAX 301-449-7011

www.detek.com

sales@detek.com

# RADIATION ALERT™

# Monitor 200

a  $\beta$   $\gamma$  x

FORMERLY THE  
**Digilert 200**



Formerly the Digilert 200, The Monitor 200 measures alpha, beta, gamma, and x-rays. Its digital display shows readings in your choice of CPM, CPS,  $\mu$ Sv/hr, mR/hr, or in accumulated counts. It has a digital display, a red count light, and a beeper that sounds with each count detected. Other features include an adjustable timer, and selectable alert. With the free Observer USB Software Family, you can set computer alarms, calibrate your instrument, and download your collected data from the internal memory for easy reporting!

### Detector

Halogen-quenched GM tube with thin mica end window. Mica window density 1.5-2.0 mg/cm<sup>2</sup>. Effective window diameter is .360 inch. Side wall is .012 inch thick.

### Operating Range

mR/hr - .001 (1 $\mu$ R) to 200 mR/hr

$\mu$ Sv/hr - .01 to 2000

CPM - 0 to 214,000

CPS - 0 to 3575

Total/ Timer - 1 to 9,999,000 counts

### Accuracy

Typically  $\pm$ 15% of reading.  $\pm$ 10% typical (NIST)

### Alarm

Internally mounted beeper  
(can be switched off for silent operation)

### Count Light

Red LED flashes with each count.

### Outputs

USB for Observer USB Software Family

### Size

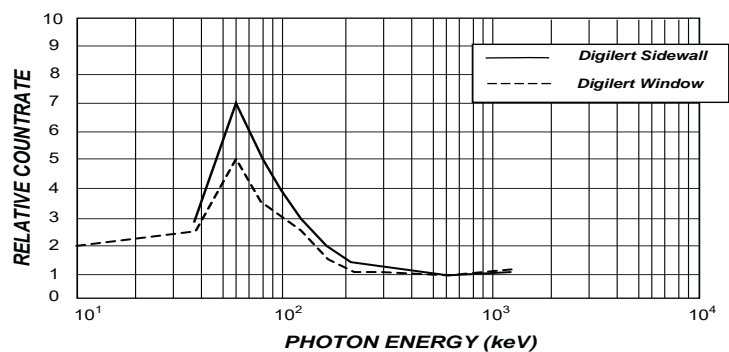
140 X 68 X 33 mm (3.5 X 2.7 X 1.3 in.)

### Energy Sensitivity

1070 CPM/mR/hr referenced to Cs<sup>137</sup>

- Detects alpha down to 2.5 MeV; typical detection efficiency at 3.6 MeV is greater than 80%.
- Detects beta at 50 keV with typical 35% detection efficiency.
- Detects beta at 150 keV with typical 75% detection efficiency.
- Detects gamma and x-rays down to 10 keV typical through the window, 40 keV minimum through the case.

ENERGY RESPONSE  
(Relative to Cs-137)



6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011  
EMAIL: sales@detek.com

# RADIATION ALERT™ Monitor 200

## Display

Backlit Graphic LCD

## Audio Indicator

Sounds with each count (can be switched off for silent operation)

## Anti-Saturation

Readout will hold at full scale in radiation fields as high as 100 times the maximum reading.

## Power Requirements

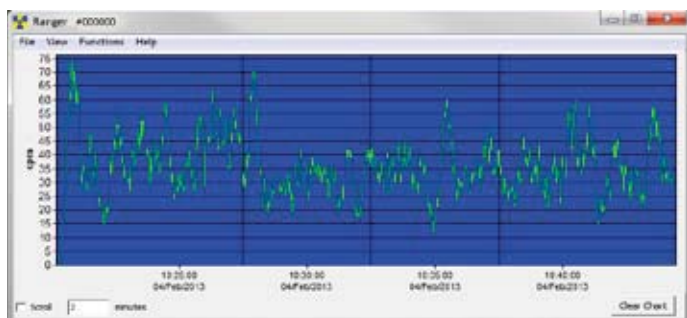
2 AA alkaline batteries

## Includes

Carrying Case, Xtreme Boot, Stand, Mini-USB Cable, Observer USB Software Download, Certificate of Conformance

## Limited Warranty

1 year limited warranty



USB Observer Software collects data stored in the internal memory of The Monitor 200



Ruggedized boot and Stand Included

		
	Monitor 200	Digilert 200
		
a B y x	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Alert	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Memory	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Included Protective Boot	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Included Stand	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GM Detector	Internal	Internal
mR/hr	.001(1µR) to 200	.001(1µR) to 200
µSv/hr	-.01 to 2000	-.01 to 2000
mSv/hr	n/a	n/a
Counts Per Minute	0 to 214,000	0 to 214,000
Counts per Second	0 to 3575	0 to 3575

6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011  
EMAIL: sales@detek.com



# RADIATION ALERT™

# Ranger

a B y x

SEI FORMERLY THE usb Inspector



Formerly the SEI Inspector USB, The Ranger offers maximum performance in a lightweight, rugged solution for surveying at the facility or in the field. The Ranger has been designed for industrial environments, but it still has all of the features you've come to love in the lab. The Ranger is a small, handheld, microprocessor-based instrument which offers excellent sensitivity to low levels of alpha, beta, gamma, and x-rays and has built in efficiencies for common isotopes to calculate activity in Bq and DPM. It has a backlit digital display, a red count light, and a beeper that sounds with each count detected. Other features include selectable alert levels, an adjustable timer, and an optional wipe test plate for swipes. Internal memory and the free Observer USB Software that allows you to download your data, set computer alarms, and calibrate your instrument!

### Detector

Internal Halogen-quenched, uncompensated GM tube with thin mica window, 1.4-2.0 mg/cm<sup>2</sup> areal density. Effective diameter of window is 45 mm (1.77 in.). Radiation symbol on front label marks the center of the detector.

### Averaging Periods

Display will update every 3 seconds. At low background levels, the update is the moving average for the past 30-second time period. The timed period for the moving average decreases as the radiation level increases.

### Operating Range

mR/hr - .001 (1µR) to 100 CPM - 0 to 350,000  
 µSv/hr - .01 to 1000 CPS - 0 to 5000  
 Total/ Timer - 1 to 9,999,000 counts

### Accuracy

(Referenced to Cs137) Typically ±15% from factory, ±10% with NIST Source Calibration

### Size

140 X 68 X 33 mm (3.5 X 2.7 X 1.3 in.)

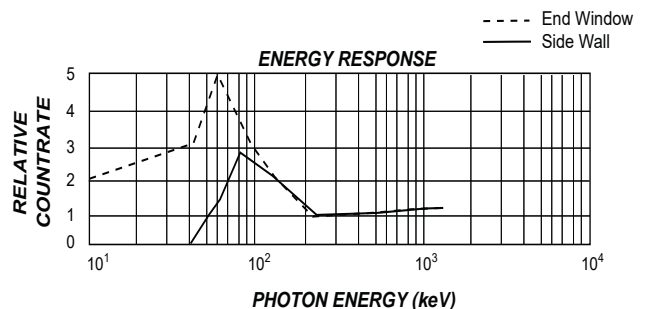
### Energy Sensitivity

3340 CPM/mR/hr referenced to Cs<sup>137</sup>

- Detects Alpha down to 2 MeV.
- Detects Beta down to .16 MeV; typical detection efficiency at 1 MeV is approx. 25%.
- Detects Gamma down to 10 KeV through the end window. Smallest detectable level for I<sup>125</sup> is .02 µCi at contact.

### Built-In Efficiencies

<sup>5</sup>Sulfur (S35), <sup>90</sup>Strontium (Sr/y90), <sup>137</sup>Cesium (Cs137), <sup>32</sup>Phosphorus (P32), <sup>14</sup>Carbon (C14), <sup>131</sup>Iodine (I131), <sup>60</sup>Cobalt (Co60), and Alpha



6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
 301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011  
 EMAIL: sales@detek.com



# RADIATION ALERT™ *Ranger*

## Display

Backlit Graphic LCD with Backlight

## Count Light

Red LED flashes with each radiation event.

## Alert Set Range

mR/hr .001 - 50 and CPM 1 - 160,000. 70db @ 1m.

## Alarm Indicator

Internally mounted beeper

(can be switched off for silent operation)

## Outputs

USB for use with Observer USB Software Family

## Anti-Saturation

Meter will hold at full scale in fields as high as 100 times the maximum reading.

## Power Requirements

Two AA alkaline batteries

## Includes

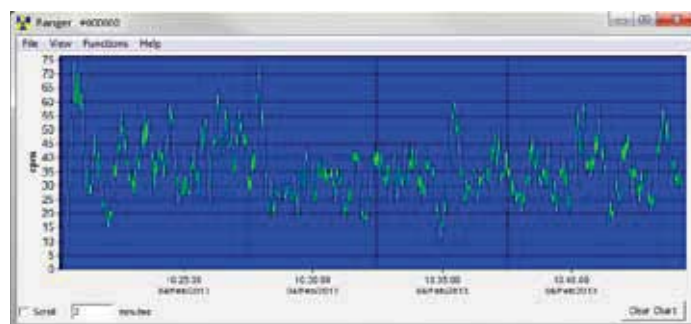
Carrying Case, Xtreme Boot, Stand, Mini-USB Cable, Observer USB Software Download, Certificate of Conformance

## Options

Wipe Test Plate, Swipes, NIST Calibration

## Limited Warranty

1 year limited



USB Observer Software collects data stored in the internal memory of The Radiation Alert Ranger



Ruggedized boot and Stand Included



View of Back



Wipe Test Plate

6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011  
EMAIL: sales@detek.com

# RADIATION ALERT™

# Ranger EXP

a B y x

FORMERLY THE  
**SEI RADIATION ALERT**  
**Inspector EXP**



Formerly the SEI Inspector EXP, The Ranger EXP offers maximum performance in a lightweight, rugged solution for using your survey meter in the field. The Ranger EXP is designed specifically for individuals operating in tough environments. The small, handheld unit offers excellent sensitivity to low levels of alpha, beta, gamma, and x-rays. The digital readout is displayed with a red count light and a beeper sounds with each count detected. Other features include an adjustable timer, selectable alert, and with the free Observer USB Software Family, you can download your collected data, set alarms, and calibrate your meter!

### Detector

RAP-RS1 Probe - External Halogen-quenched, uncompensated GM tube with thin mica window, 1.4-2.0 mg/cm<sup>2</sup> areal density. Effective diameter of window is 45 mm (1.75 in.).

### Operating Range

mR/hr - .001 (1μR) to 100      CPM - 0 to 350,000  
 μSv/hr - .01 to 1000      CPS - 0 to 5000  
 Total/Timer - 1 to 9,999,000 counts

### Accuracy

(Referenced to Cs137) Typically ±15% from factory, ±10% with NIST Source Calibration

### Energy Sensitivity

3340 CPM/mR/hr referenced to Cs<sup>137</sup>

- Detects Alpha down to 2 MeV.
- Detects Beta down to .16 MeV; typical detection efficiency at 1 MeV is approx. 25%.
- Detects Gamma down to 10 KeV through the end window.
- Smallest detectable level for I<sup>125</sup> is .02 μCi at contact.

### Display

Graphic LCD with Backlight

### Alert Set Range

mR/hr .001 - 100 and CPM 1 - 350,000.  
 70db @ 1m.

### Count Light

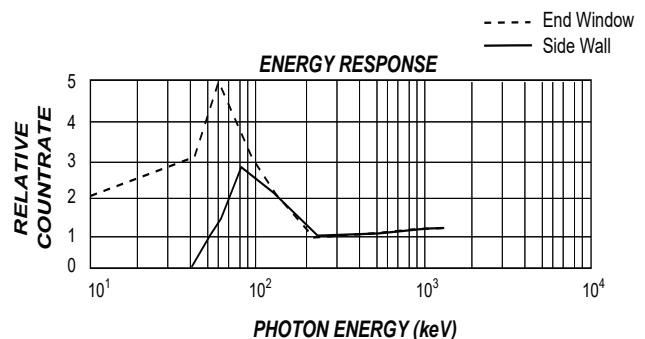
Red LED flashes with each radiation event.

### Audio Indicator

Internally mounted beeper  
 (can be switched off for silent operation)

### Built-In Efficiencies

<sup>55</sup>Sulfur (S35), <sup>90</sup>Strontium (Sr/y90), <sup>137</sup>Cesium (Cs137), <sup>32</sup>Phosphorus (P32), <sup>14</sup>Carbon (C14), <sup>131</sup>Iodine (I131), <sup>60</sup>Cobalt (Co60), and Alpha



6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
 301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011  
 EMAIL: sales@detek.com

# RADIATIONAL ALERT™ Ranger<sup>EXP</sup>

## Size

140 X 68 X 33 mm (3.5 X 2.7 X 1.3 in.)

Probe: 260 X 70 X 25 mm (10.25 X 2.75 X 1 in)

## Outputs

USB for use with Observer USB Software Family

## Anti-Saturation

Meter will hold at full scale in fields as high as 100 times the maximum reading.

## Power Requirements

Two AA alkaline batteries.

## Includes

Carrying Case, Xtreme Boot, Stand, Mini-USB Cable, Observer USB Software Download, Certificate of Conformance

## Limited Warranty

1 year limited warranty



						
	Monitor 200	Digilert 200	The Ranger	SEI Inspector USB	The Ranger EXP	SEI Inspector EXP
a B y x	✓	✓	✓	✓	✓	✓
Alert	✓	✓	✓	✓	✓	✓
Internal Memory	✓	✓	✓	✓	✓	✓
Free Observer USB	✓	✓	✓	✓	✓	✓
GM Detector	Internal	Internal	Internal	Internal	External	External
Included Protective Boot	✓		✓		✓	
mR/hr	.001(1µR) to 200	.001(1µR) to 200			.001(1µR) to 100	
µSv/hr	-.01 to 2000	-.01 to 2000			.01 to 1000	
mSv/hr	n/a	n/a			n/a	
Counts Per Minute	0 to 214,000	0 to 214,000			0 to 350,000	
Counts per Second	0 to 3575	0 to 3575			0 to 5000	

6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
 301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011  
 EMAIL: sales@detek.com





DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com



# ND-4000

ECONOMICAL AREA MONITOR  
 12V DC PORTABLE WITH BATTERY AND BATTERY CHARGER







DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com

# ND-4000

ECONOMICAL AREA MONITOR  
 12V DC PORTABLE WITH BATTERY AND BATTERY CHARGER

## FEATURES:

- DETECTS GAMMA AND X-RAY
- NON-ADJUSTABLE TRIP POINT: 2 mR/hr STANDARD, OTHER TRIP POINTS AVAILABLE
- AUDIO PIEZO ALERT
- LARGE RED STROBE WARNING LIGHT
- 17 AMP HOUR BATTERY HOUSED IN MONITOR ENCLOSURE
- UNIT MAY BE USED WHILE BATTERY CHARGER IS PLUGGED TO 120V AC

## SPECIFICATIONS

ENERGY RESPONSE.....GAMMA AND X-RAY FROM 80-2000 KeV, +/-20%

MAXIMUM INTENSITY OR SATURATION.....IN EXCESS OF 1000 R/hr

ENVIRONMENTAL EFFECTS.....HUMIDITY LIMITS: 0-99% NON-CONDENSING

TEMPERATURE LIMITS.....-30 DEGREES C to +50 DEGREES C (EXCLUDING BATTERY)

DETECTOR.....HALOGEN QUENCHED, ENERGY COMPENSATED GEIGER MUELLER TUBE  
 EFFECTIVE LENGTH AND DIAMETER: 1.100 INCHES x 0.482 INCH  
 WALL THICKNESS: 30 mg/cm SQUARED

SIGNALS.....ONE POWER ON/OFF GREEN INDICATOR LIGHT;  
 ONE ALARM TRIP RED BEACON LIGHT AND AUDIO ALERT

CONTROLS.....POWER ON-OFF SWITCH; AUDIBLE ON-OFF SWITCH

POWER.....12V DC BATTERY WITH CHARGER

ENCLOSURE.....NEMA 3R STEEL. MEETS UL 50 TYPE 3R, IEC 529, IP 32.  
 12 INCHES TALL (INCLUDING BEACON) x 10.8 INCHES WIDE (INCLUDING HANDLES) x 8 INCHES DEEP



DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com



# ND-4000B

ECONOMICAL AREA MONITOR  
 120V AC HARD WIRED OR PLUG-IN VERSIONS



POWER ON



RADIATION PRESENT  
 (SEE MANUAL)

ND-4000B  
 AREA MONITOR

NDS PRODUCTS

111 ANDERSON  
 PASADENA, TX 77506  
 TEL. 713/475-2886 FAX 713/477-6741

DANGER 120 VAC  
 UNPLUG POWER CORD  
 BEFORE REMOVING  
 COVER PLATE!

NDS PRODUCTS, INC.  
 TX LICENSE 100991  
 ENERGY: 0.662 RnU  
 CAL DATE: MAY-30-00  
 DUE DATE: MAY-30-01  
 S/N: 34974

MADE IN USA

SERIAL NR: 34974

120 VAC  
 ALARM

120 VAC  
 ALARM



DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com

# ND-4000B

ECONOMICAL AREA MONITOR  
 120V AC HARD-WIRED OR PLUG-IN VERSIONS

## FEATURES:

- DETECTS GAMMA AND X-RAY
- NON-ADJUSTABLE TRIP POINT: 2 mR/hr STANDARD, OTHER TRIP POINTS AVAILABLE
- WILL ACTIVATE ANY 120V AC ALARM DEVICE SUCH AS:
  - WARNING LIGHTS
  - SIRENS
  - DOOR INTERLOCKS

## SPECIFICATIONS

ENERGY RESPONSE.....GAMMA AND X-RAY FROM 80-2000 KeV, +/-20%

MAXIMUM INTENSITY OR SATURATION.....IN EXCESS OF 1000 R/hr

ENVIRONMENTAL EFFECTS.....HUMIDITY LIMITS: 0-99% NON-CONDENSING

TEMPERATURE LIMITS.....-30 DEGREES C to +50 DEGREES C

DETECTOR.....HALOGEN QUENCHED, ENERGY COMPENSATED GEIGER MUELLER TUBE  
 EFFECTIVE LENGTH AND DIAMETER: 1.100 INCHES x 0.482 INCH  
 WALL THICKNESS: 30 mg/cm SQUARED

SIGNALS.....ONE AC POWER ON/OFF GREEN INDICATOR LIGHT;  
 ONE ALARM TRIP RED INDICATOR LIGHT

POWER.....120V AC, 50 to 60 CYCLES

REMOTE ALARM OUTLETS.....TWO CONTACTS RATED AT 5 AMPS 120V AC

POWER AND ALARM FUSES (2).....5 AMPS AT 120V AC

ENCLOSURE.....NEMA 3R STEEL. MEETS UL 50 TYPE 3R, IEC 529, IP 32.  
 8 INCHES x 8 INCHES x 4 INCHES DEEP

### STANDARD CONTROL UNITS:

ND-4000B: PLUG-IN UNIT WITH 6 FT POWER CORD AND TWO 120V OUTLETS  
 ND-4000B: HARD-WIRE READY WITH 1/2 INCH CONDUIT CONNECTIONS

### BUILT-IN OPTIONS:

ND-4000BL: WITH RED ROTATING WARNING LIGHT MOUNTED TO TOP OF UNIT  
 ND-4000BLA: WITH THE ABOVE LIGHT PLUS AN AUDIO ALARM

### ADD-ON OPTIONS AVAILABLE:

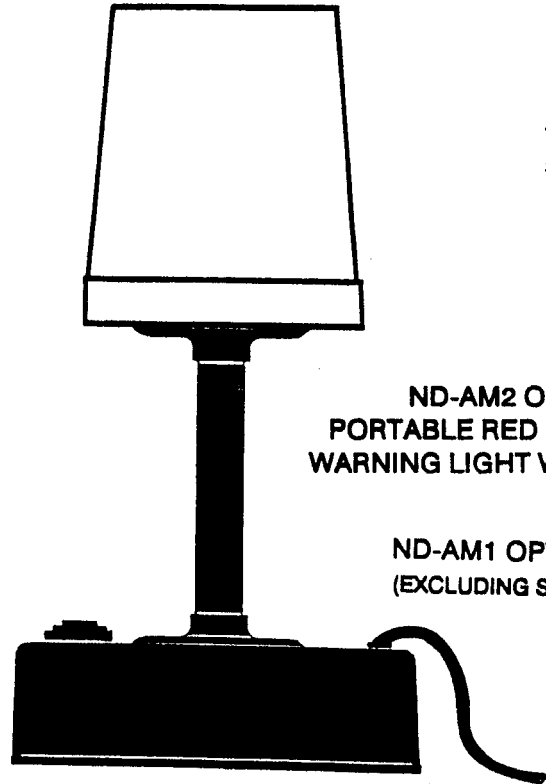
OPTION 1 ND-AM1: PORTABLE RED ROTATING WARNING LIGHT WITH STAND AND 25 FT POWER CORD  
 OPTION 2 ND-AM2: PORTABLE SIREN AND RED ROTATING LIGHT WITH STAND AND 25 FT POWER CORD



DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com

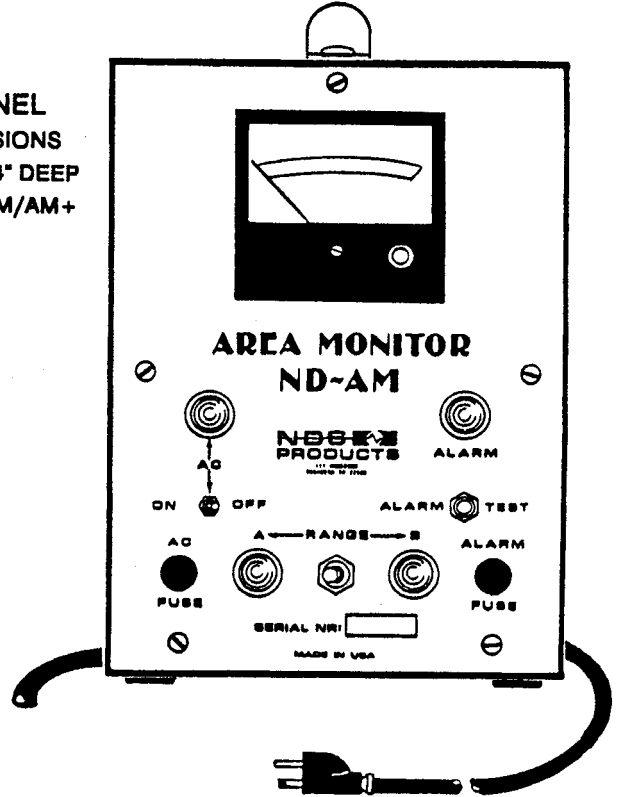
**ND-AM/AM+**  
 AREA MONITORS and OPTIONS

**CONTROL PANEL**  
 ENCLOSURE DIMENSIONS  
 7" WIDE x 10" TALL x 9.4" DEEP  
 STANDARD WITH ND-AM/AM+



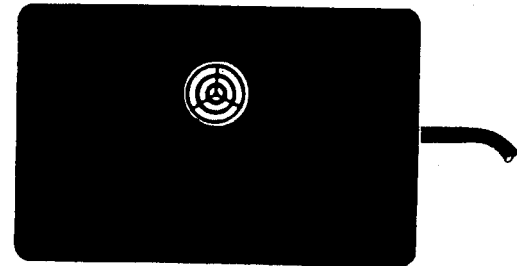
**ND-AM2 OPTION**  
 PORTABLE RED ROTATING  
 WARNING LIGHT WITH SIREN

**ND-AM1 OPTION**  
 (EXCLUDING SIREN)

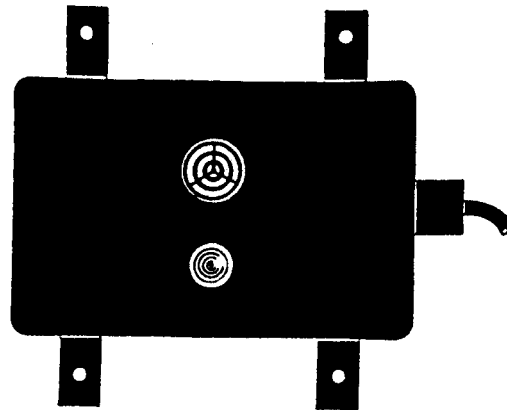


**AREA MONITOR**  
**ND-AM**

**NBSE PRODUCTS**  
 MADE IN THE USA



**ND-AM3 OPTION**  
 PORTABLE SIREN



**REMOTE DETECTOR UNIT**  
 WITH SIREN & INDICATOR LIGHT  
 DIMENSIONS: 4.7" TALL x 7.4" LONG x 2.25" DEEP  
 STANDARD WITH ND-AM+  
 SAME UNIT EXCLUDING SIREN FOR ND-AM





DETEK, Inc.  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com

# ND-AM/AM+

AREA MONITORS and OPTIONS  
 120V AC, TWO SELECTABLE TRIP RANGES

## FEATURES:

- ENERGY RESPONSE: GAMMA AND X-RAY FROM 60-2000 KeV, +/- 20%
- SYSTEM INCLUDES A CONTROL PANEL UNIT AND A DETECTOR UNIT THAT CAN BE MOUNTED UP TO 1000 FEET FROM THE CONTROL PANEL. STANDARD MODEL SUPPLIED WITH 25 FEET OF CABLE
- DETECTOR UNIT CONTAINS AN INTERMITTENT TONE, FAST PULSE SIREN AND INDICATOR LIGHT
- DEPENDING UPON RANGES CHOSEN, THE ALARM TRIP LEVEL CAN BE SET FROM 3% TO 100% OF SCALE
- WILL ACTIVATE ANY 120V AC ALARM DEVICE SUCH AS: WARNING LIGHTS, ADDITIONAL SIRENS AND DOOR INTERLOCKS
- SYSTEM IS CONFIGURABLE TO YOUR REQUEST

## SPECIFICATIONS

RANGES: ISOTOPE RADIOGRAPHY STANDARD IS 0-50 and 0-500mR/hr  
 X-RAY STANDARD IS 0-5 and 0-50 mR/hr

OPTIONAL RANGES: 1) 0-10 and 0-100 mR/hr 3) 0-100 and 0-1000 mR/hr  
 2) 0-20 and 0-200 mR/hr 4) 0-10 and 0-100 R/hr

MAXIMUM INTENSITY OR SATURATION.....IN EXCESS OF 1000 R/hr

DETECTOR UNIT.....CONTAINS ENERGY COMPENSATED GM TUBE, SIREN  
 WITH OUTPUT OF 80-95 dB @ 2 FEET, AND RED INDICATOR LIGHT

TEMPERATURE/HUMIDITY LIMITS.....-30 DEGREES C to +50 DEGREES C;  
 0-99% NON-CONDENSING HUMIDITY

PANEL UNIT CONTROLS.....POWER OFF-ON SWITCH; ALARM TEST SWITCH; RANGE SWITCH

DISPLAY.....METER INDICATOR WITH ALARM TRIP POINT ADJUST;  
 AMBER POWER ON LIGHT; RED ALARM TRIP LIGHT; TWO YELLOW RANGE LIGHTS

POWER.....120V AC, 50 TO 60 CYCLES

REMOTE ALARM OUTLETS.....TWO CONTACTS RATED AT 5 AMPS 120V AC  
 LOCATED ON BACK OF CONTROL PANEL

POWER AND ALARM FUSES (2).....5 AMPS LOCATED ON FRONT OF CONTROL PANEL

### STANDARD CONTROL UNITS:

ND-AM: CONTROL PANEL, DETECTOR UNIT, 25 FT CABLE AND 6 FT POWER CORD

ND-AM+ : THE ABOVE MONITOR, DETECTOR UNIT/SIREN, 25 FT CABLE AND 6 FT POWER CORD

### ADD-ON OPTIONS AVAILABLE:

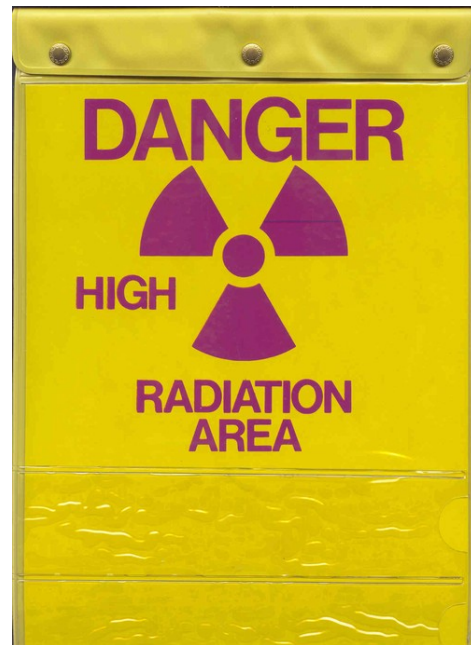
- OPTION 1 ND-AM1: PORTABLE RED ROTATING WARNING LIGHT AND 25 FOOT CABLE
- OPTION 2 ND-AM2: PORTABLE SIREN AND RED ROTATING LIGHT 25 FOOT CABLE
- OPTION 3 ND-AM3: PORTABLE SIREN WITH 25 FOOT CABLE



## **NONDESTRUCTIVE TESTING EQUIPMENT**

### **Pocket Sign system with interchangeable inserts.**

Suspend with rope using snap-flap, or request eyelets.



Sturdy cardboard sign is permanently heat-sealed in flexible vinyl with 2 or 3 pockets for inserts.

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



# NONDESTRUCTIVE TESTING EQUIPMENT

## Inserts

Item #	Name		
<a href="#">SC-001</a>	Insert, Radiation Area	<a href="#">SC-060</a>	Insert, This Equip Produc Rad Whn Ener
<a href="#">SC-002</a>	Insert, Low Radiation Area	<a href="#">SC-061</a>	Insert, Authorized Entrance Only
<a href="#">SC-003</a>	Insert, High Radiation Area	<a href="#">SC-062</a>	Insert, Tritium
<a href="#">SC-008</a>	Insert, Dose Rate At This Point	<a href="#">SC-063</a>	Insert, Isotope Amount Date
<a href="#">SC-009</a>	Insert, Radiography In Progress	<a href="#">SC-064</a>	Insert, Contaminated Water
<a href="#">SC-011</a>	Insert, Radioactive Material	<a href="#">SC-065</a>	Insert, Contaminated Ash
<a href="#">SC-012</a>	Insert, Radioactive Material Area	<a href="#">SC-067</a>	Insert, Contaminated Waste
<a href="#">SC-013</a>	Insert, (dose Rate; Etc)	<a href="#">SC-068</a>	Insert, Contaminated Materials
<a href="#">SC-014</a>	Insert, Contaminated Area	<a href="#">SC-069</a>	Insert, Contaminated Clothing
<a href="#">SC-015</a>	Insert, Controlled Surface Cont.	<a href="#">SC-070</a>	Insert, All Persnl Must Frsk Befr Leav
<a href="#">SC-016</a>	Insert, Requirements For Entry	<a href="#">SC-071</a>	Insert, Shoe Covers Required
<a href="#">SC-020</a>	Insert, Eating/drinking/smoking Prohib	<a href="#">SC-072</a>	Insert, No Exit-exit Centrl Pt
<a href="#">SC-021</a>	Insert, Airborne Radioactivity	<a href="#">SC-073</a>	Insert, Do Not Enter
<a href="#">SC-022</a>	Insert, Required For Entry	<a href="#">SC-074</a>	Insert, Personnel Dosimetry Required
<a href="#">SC-023</a>	Insert, Requirement Etc Cont.	<a href="#">SC-075</a>	Insert, Rep Required For Entry
<a href="#">SC-024</a>	Insert, Respiratory Pro. Require	<a href="#">SC-076</a>	Insert, Controlled Access Area
<a href="#">SC-025</a>	Insert, No Entry By	<a href="#">SC-077</a>	Insert, Authorized Personnel Only
<a href="#">SC-026</a>	Insert, Unauthorized Personnel	<a href="#">SC-078</a>	Insert, Maintenance In Progress
<a href="#">SC-027</a>	Insert, Keep Out	<a href="#">SC-079</a>	Insert, Notify Health Physics
<a href="#">SC-028</a>	Insert, Yellow Lab Coat Required	<a href="#">SC-080</a>	Insert, Mr/hr Gamma Mrem/hr Neut
<a href="#">SC-029</a>	Insert, Mr/hr At This Point Is.	<a href="#">SC-081</a>	Insert, Combined Dose Gamma/neut
<a href="#">SC-030</a>	Insert, Film Badge Required	<a href="#">SC-082</a>	Insert, Combine Dose
<a href="#">SC-031</a>	Insert, X-ray Producing Machine	<a href="#">SC-083</a>	Insert, Mrad/hr Beta Mrem/hr
<a href="#">SC-032</a>	Insert,neutron	<a href="#">SC-084</a>	Insert, Entering Rad Exposure
<a href="#">SC-033</a>	Insert, Rwp Required Entry	<a href="#">SC-085</a>	Insert, Mrad/mr Beta Mr/hr
<a href="#">SC-034</a>	Insert, Full Anti-con Cloth	<a href="#">SC-086</a>	Insert, Iodination In Progress
<a href="#">SC-037</a>	Insert, For Vistors	<a href="#">SC-087</a>	Insert, High Radiation Area
<a href="#">SC-038</a>	Insert, Notify Rad. Protection	<a href="#">SC-088</a>	Insert, Keep Patient In Room
<a href="#">SC-041</a>	Insert, Rwp/swp Required	<a href="#">SC-089</a>	Insert, Grave Danger
<a href="#">SC-042</a>	Insert, Notify H/p Before Entry	<a href="#">SC-090</a>	Insert, Very High Radiation Area
<a href="#">SC-043</a>	Insert, High Contamination Area	<a href="#">SC-091</a>	Insert, You Are In A Radiation
<a href="#">SC-046</a>	Insert, Keep Locked Or Guarded	<a href="#">SC-092</a>	Insert, Dosimetry Required For Entry
<a href="#">SC-052</a>	Insert, Pocket Dosimeter Required	<a href="#">SC-093</a>	Insert, Controlled Area
<a href="#">SC-053</a>	Insert, Extremity Dosimeter Required	<a href="#">SC-094</a>	Insert, When Beacon Is Energized
<a href="#">SC-054</a>	Insert, High	<a href="#">SC-095</a>	Insert, Hot Spot
<a href="#">SC-055</a>	Insert, Contamination	<a href="#">SC-096</a>	Insert, Tld & Pic Required For Entry
<a href="#">SC-058</a>	Insert, In Case For Emergency Call__	<a href="#">SC-097</a>	Insert, Tld Required For Entry
<a href="#">SC-059</a>	Insert, Rad MAT Is Not Perm In Ths Ara	<a href="#">SC-098</a>	Insert, Contamination Area

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



## NONDESTRUCTIVE TESTING EQUIPMENT

### BARRICADE TAPE



Prevent accidents by increasing visibility of hazards with our non-adhesive Barricade Tape. Tape is a lightweight, economical, reusable polyethylene, with a continuous repeat of message or warning. Can be tied, stapled or nailed in place. Meets OSHA 1910.144 for marking physical hazards. Comes standard 3" x 1000'. Also available in 200', 300' and 500' lengths. Other widths available by special order. Comes in a variety of mil thicknesses.



#### WOVEN PLASTIC BARRIER TAPE



Extra-durable polypropylene tapes are long-lasting solutions for marking off-limit or hazardous areas and for crowd control. Tensile strength is 100 lbs. for the 3/4" tape and 300 lbs. for the 2" tape. Available in solid colors, stripes, or printed with Caution or Danger legends. Custom printing available.

Please Specify Color

**Colors Available:** YB = yellow/black/yellow, WR = white/red/white, YM = yellow/magenta/yellow, YR = yellow/red/yellow, RB = red/black/red, YL = solid yellow, RD = solid red and OR = solid orange.

**Sizes Available:** 3/4" x 150 ft., 2" x 200 ft., 2" x 150 ft.



#### REWIND REEL

The Rewind Reel makes Barrier Tape even easier to reuse. Just attach the tape to a tree, post or barricade and dispense as needed. Hang reel with tape still attached to the last post. Simply roll it back up after the job is through. (For 2" tape only.)

\* Quick \* Reusable \* Easy \* Lightweight \* Labor Saving \* Zinc-plated Steel

*Tape is also available mounted to the reel. Specify by adding tape color code as suffix to Reel Cat. No. Ex: WRR-01-RB.*

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



# Markers (mounted & unmounted characters)

If you have any questions about the size characters you need or are looking for additional sizes and styles, please call our customer service department, or mail us a sample so that we may send you exactly what you're looking for.



## UNmounted Lead Characters

style	(3/16")	(1/4")	3/8"	(1/2")	(5/8")	(1" R&L Only)	(1" arrow)
FLAT FACE	XTUF-36	XTUF-14	XTUF-38	XTUF-12	XTUF-58	XTUF-01	X
DEEP BLOCK	X	XTUB-14	XTUB-38	XTUB-12	(see Flat Face)	X	X
ARROWS	X	XTUA-14	X	XTUA-12	X	X	XTUA-01



## Individual Mounted Characters (Flat Face)

Cat. #	lead/plastic size	Comments
XTSF-3658	3/16" on 5/8"	Fits: LLH-58, LLH-2, LLH-3, Veri-Thin
XTSF-3634	3/16" on 3/4"	Fits: Legal (regular)
XTSF-1458	1/4" on 5/8"	
XTSF-1434	1/4" on 3/4"	
XTSF-1478	1/4" on 7/8"	Fits: Eclipse, Perfection
XTSF-1234	1/2" on 3/4"	
XTIF-3658	3/16" on 5/8"	Fits: Ideal (special offset mounting)



Characters are mounted on CLEAR flat plastic tabs to fit a variety of letter holders.

## Flat Surface Mounted Words (Flat Face)

description	example	cat#	cat#	cat#	cat#
single letter	3	XVFW-0136	XVFW-0114	XVFW-0112	XVFW-0101
2-3 letters	EXT	XVFW-2336	XVFW-2314	XVFW-2312	XVFW-2301
4-5 letters	25 MIN	XVFW-4536	XVFW-4514	XVFW-4512	XVFW-4501
6-7 letters	STRESS	XVFW-6736	XVFW-6714	XVFW-6712	XVFW-6701
8+ letters	PORTABLE	XVFW-8036	XVFW-8014	XVFW-8012	XVFW-8001
Lead/Plastic Sizes	3/16" on 3/4"	1/4" on 3/4"	1/2" on 3/4"	1" on 1 1/2"	



Words made from Mounted Letters glued to the surface of a single CLEAR vinyl strip.

## Lead Letter Case

Cat.#XSLC-36

- Injection Molded Box.
- 36 scoop-bottom compartments (for A-Z and 0-9).
- Side compartment for holder.

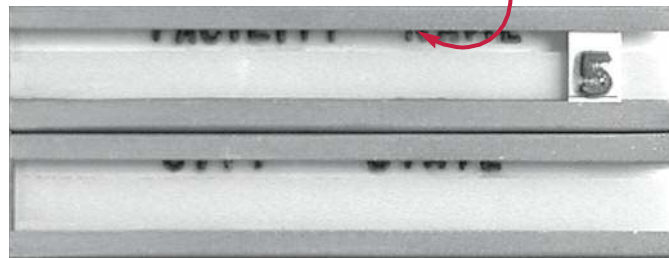


# Markers (lead letter holders & sets)

## Ideal Cushion Marker

Cat.# XSIC-21  
Holder only.  $3\frac{1}{2}$ " x  $1\frac{5}{16}$ "

Double channel with cushions;  
imprint in the upper section  
of each channel.



Cat.# XSIC-22  
Complete Set Includes:  
1ea. holder  
2ea. A-Z  
4ea. 0-9  
2ea. A, E, I, O, U  
1ea. 36-letter case

(Replacement characters:  
 $\frac{3}{16}$ " on  $\frac{5}{8}$ " plastic tabs, offset.  
Reorder Cat.#XTIF-3658)

## Eclipse Cushion Marker

Cat.# XSEC-11  
Holder only.  $3\frac{1}{2}$ " x  $1\frac{5}{16}$ "

Single channel with cushion;  
imprint above and below the  
centerline.



Cat.# XSEC-12  
Complete Set Includes:  
1ea. holder  
2ea. R, L  
4ea. 0-9  
1ea. 36-letter case

(Replacement characters:  
 $\frac{1}{4}$ " on  $\frac{1}{8}$ " plastic tabs.  
Reorder Cat.#XTSF-1478)

## Legal Marker

Cat.# XSLG-21  
Holder only.  $3\frac{1}{2}$ " x  $1\frac{5}{8}$ "

Double aluminum channels;  
imprint between the two  
channels.



Cat.# XSLG-22  
Complete Set Includes:  
1ea. holder  
2ea. A-Z  
4ea. 0-9  
2ea. A, E, I, O, U  
1ea. 36-letter case

(Replacement characters:  
 $\frac{3}{16}$ " on  $\frac{3}{4}$ " plastic tabs;  
Reorder Cat.#XTSF-3634)

## Veri-Thin Legal

Cat.# XSVL-21  
Holder only.  $3\frac{1}{2}$ " x  $1\frac{13}{16}$ "

Double aluminum channels;  
imprint down and in between  
the two channels.

Great for  
Bucky Trays!



Cat.# XSVL-22  
Complete Set Includes:  
1ea. holder  
2ea. A-Z  
4ea. 0-9  
2ea. A, E, I, O, U  
1ea. 36-letter case

(Replacement characters:  
 $\frac{3}{16}$ " on  $\frac{5}{8}$ " plastic tabs.  
Reorder Cat.#XTSF-3658)

## Perfection

Cat.# XSPF-11  
Holder only.  $3\frac{1}{2}$ " x  $1\frac{5}{16}$ "

Single aluminum channel;  
imprint above and below  
the channel.



Cat.# XSPF-12  
Complete Set Includes:  
1ea. holder  
2ea. R, L  
4ea. 0-9  
1ea. 36-letter case

(Replacement characters:  
 $\frac{1}{4}$ " on  $\frac{1}{8}$ " plastic tabs.  
Reorder Cat.#XTSF-1478)



6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011  
EMAIL: sales@detek.com



# NONDESTRUCTIVE TESTING EQUIPMENT

## X-RAY FILM EXPOSURE HOLDERS



### AQ Flexible

Vinyl impregnated flexible film holders. Ideal for bending around small objects such as piping and tanks. Provided in Blue unless Black is specified. Also available with lead backing, on request.



### Semi-Rigid Black Vinyl

Outer cover made of 60 point abs black plastic. Has a tape hinge and a film envelope like the Flexible Film Holders. Ideal for heavy castings.



### Rigid Red Vinyl

Rigid cardboard impregnated with red vinyl. Hinged on short side for easy handling of film. Also available with lead backing on request.

### Stainless Steel

Die formed Stainless steel frame, hand welded for extra strength and durability. Heavy-duty tempered stainless steel crossbars that pivot on a rivet. Aluminum lined doors to absorb secondary radiation.



TYPE	AQ	SEMI-RIGID	RIGID RED	STAINLESS
SIZE	FLEXIBLE	BLACK VINYL	VINYL	STEEL
3 1/2" X 17"	REH-111	REH-311	REH-511	REH-411
4 1/2" X 10"	REH-112	REH-312	REH-512	REH-412
4 1/2" X 17"	REH-113	REH-313	REH-513	REH-413
5" X 7"	REH-114	REH-314	REH-514	REH-414
7" X 17"	REH-115	REH-315	REH-515	REH-415
8" X 10"	REH-116	REH-316	REH-516	REH-416
10" X 12"	REH-117	REH-317	REH-517	REH-417
11" X 14"	REH-118	REH-318	REH-518	REH-418
14" X 17"	REH-119	REH-319	REH-519	REH-419

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: sales@detek.com**



# NONDESTRUCTIVE TESTING EQUIPMENT

## LEAD INTENSIFYING SCREENS



### HEXALON

High quality lead alloy foil mounted on cardboard. Available in both .005" and .010" in standard US industrial sizes of 3 1/2" x 17" thru 14" x 17". All corners are machine cut to a smooth 1/2" radius unless otherwise specified. Protective overlamine protects during shipping and storage. Remove before using.

### PRIME

Production service screen with mirror finish. Ideal combination for quality and price. Uncoated lead off plastic. Prolongs life while preventing oxidation.



surface protected by peel-

### SELECT

High quality screen ideal for high energy applications. Available in unbacked, Bristol board backed, 1/32" rubber or vinyl backed. Specify square or 1/2" rounded corners. Thicknesses up to .020" and .030".

### TWEEN

Designed for applications requiring double loaded shots. This unique screen has .002" lead foil on each side of a thin cardboard. Intensifies the back film

SCREEN	HEXALON		PRIME		SELECT BRISTOL		SELECT	RUBBER	OR VINYL BACKED		TWEEN
TYPE	0.005"	0.010"	0.005"	0.010"	0.020"	0.030"	0.005"	0.010"	0.020"	0.030"	0.002"/0.002"
<b>3 1/2" X 17"</b>	RLS-581	RLS-181	RLS-531	RLS-131	RLS-251	RLS-351	RLS-571	RLS-171	RLS-271	RLS-381	RLS-441
<b>4 1/2" X 10"</b>	RLS-582	RLS-182	RLS-532	RLS-132	RLS-252	RLS-352	RLS-572	RLS-172	RLS-272	RLS-382	RLS-442
<b>4 1/2" X 17"</b>	RLS-583	RLS-183	RLS-533	RLS-133	RLS-253	RLS-353	RLS-573	RLS-173	RLS-273	RLS-383	RLS-443
<b>5" X 7"</b>	RLS-584	RLS-184	RLS-534	RLS-134	RLS-254	RLS-354	RLS-574	RLS-174	RLS-274	RLS-384	RLS-444
<b>7" X 17"</b>	RLS-585	RLS-185	RLS-535	RLS-135	RLS-255	RLS-355	RLS-575	RLS-175	RLS-275	RLS-385	RLS-445
<b>8" X 10"</b>	RLS-586	RLS-186	RLS-536	RLS-136	RLS-256	RLS-356	RLS-576	RLS-176	RLS-276	RLS-386	RLS-446
<b>10" X 12"</b>	RLS-587	RLS-187	RLS-537	RLS-137	RLS-257	RLS-357	RLS-577	RLS-177	RLS-277	RLS-387	RLS-447
<b>11" X 14"</b>	RLS-588	RLS-188	---	---	RLS-258	RLS-358	RLS-578	RLS-178	RLS-278	RLS-388	---
<b>14" X 17"</b>	RLS-589	RLS-189	RLS-539	RLS-139	RLS-259	RLS-359	RLS-579	RLS-179	RLS-279	RLS-389	RLS-449
<b>70 MM X 180 FT</b>	---	RLS-195	---	---	---	---	---	---	---	---	---
<b>70 MM X 300 FT</b>	RLS-595	---	---	---	---	---	---	---	---	---	---
<b>3 1/2" X 180 FT</b>	---	RLS-196	---	---	---	---	---	---	---	---	---
<b>3 1/2" X 300 FT</b>	RLS-596	---	---	---	---	---	---	---	---	---	---
<b>4 1/2" X 180 FT</b>	---	RLS-197	---	---	---	---	---	---	---	---	---
<b>4 1/2" X 300 FT</b>	RLS-597	---	RLS-593	---	---	---	---	---	---	---	---
<b>17" X 54 FT</b>	---	RLS-198	---	---	---	---	---	---	---	---	---
<b>17" X 95 FT</b>	RLS-598	---	---	---	---	---	---	---	---	---	---
<b>70 MM X 150 FT</b>	---	---	---	RLS-194	---	---	---	---	---	---	---
<b>90 MM X 150 FT</b>	---	---	---	RLS-199	---	---	---	---	---	---	---
<b>90 MM X 300 FT</b>	---	---	RLS-599	---	---	---	---	---	---	---	---
<b>4 1/2" X 150 FT</b>	---	---	---	RLS-191	---	---	---	---	---	---	---
<b>17" X 50 FT</b>	---	---	---	RLS-192	---	---	---	---	---	---	---
<b>17" X 100 FT</b>	---	---	RLS-592	---	---	---	---	---	---	---	---

Select screens up to 14" x 17" require crating - \$30. Hexalox screens are \$10. per box (up to 50 per box). Specify square or rounded corners.

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: sales@detek.com**



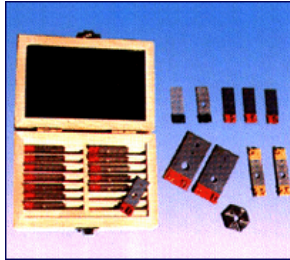


# NONDESTRUCTIVE TESTING EQUIPMENT

## PENETRAMETERS

(hole or plaque type)

Precision penetrameters are also referred to as IQI (Image Quality Indicators). Hole or Plaque type penetrameters are marked according to their specification. Each penetrameter exceeds or conforms to requirements of each code or Mil Standard. Lead figures identifying the penetrameter size and in the case of some MIL Specs, the material, are affixed to the penetrameter. Penetrameter material is also identified by a unique color code. Each penetrameter is chemically etched, identifying the material and specification. Sharp, smooth edges with accurate, perfectly spaced, drilled and reamed holes, give the radiographer every advantage in obtaining clear, well defined images on the radiograph.



Some specifications use a number which represents 2% of the thickness of the material to be x-rayed (and the actual thickness of the penetrameter). Other specifications mark the penetrameter according to the thickness of material to be x-rayed.

<b>Material Thickness to be x-rayed</b>	.50"	.75"	1.0"	1.25"	1.50"	2.00"
<b>Actual Penny Thickness</b>	0.010"	0.015"	0.020"	0.025"	0.030"	0.040"
<b>ASME, ASTM E-1025, API, AWS</b>	#10	#15	#20	#25	#30	#40
<b>NAVSEA 271, ASTM E-1742, NAVSHIPS</b>	.50	.75	1	1.2	1.5	2

Penetrameters are priced by material and thickness. Select the material and thickness range from the chart below to determine part number. Specify Part number, Specification and actual penetrameter number or thickness desired (i.e. – RPN-311 ASME. Stainless, 10 ea - #25, and 15 ea - #30). All penetrameters are accompanied by a Certificate of Conformance to the specification. Serialization and encapsulation are available upon request at a nominal additional charge.

SIZE	0.06" - 1.0"	1.2" - 2.5"	2.6" - 5.0"	5.2" - 8.0"	8.2" - 20.0"	SET A (25)	SET B (11)
MATERIAL	#5 - #20	#25 - #50	#52 - #100	#110 - #160	#170 - #400	#5 - #50	#55 - #160
<b>INCONEL</b>	RPN-010	RPN-011	RPN-021	RPN-025	RPN-030	RPN-040	RPN-050
<b>ALUMINUM</b>	RPN-110	RPN-111	RPN-121	RPN-125	RPN-130	RPN-140	RPN-150
<b>STEEL</b>	RPN-210	RPN-211	RPN-221	RPN-225	RPN-230	RPN-240	RPN-250
<b>STAINLESS</b>	RPN-310	RPN-311	RPN-321	RPN-325	RPN-330	RPN-340	RPN-350
<b>MAGNESIUM</b>	RPN-410	RPN-411	RPN-411	RPN-415	RPN-430	RPN-440	RPN-450
<b>BRASS</b>	RPN-510	RPN-511	RPN-521	RPN-525	RPN-530	RPN-540	RPN-550
<b>COPPER</b>	RPN-610	RPN-611	RPN-621	RPN-625	RPN-630	RPN-640	RPN-650
<b>CuNi</b>	RPN-710	RPN-711	RPN-721	RPN-725	RPN-730	RPN-740	RPN-750
<b>TITANIUM</b>	RPN-810	RPN-811	RPN-821	RPN-825	RPN-830	RPN-840	RPN-850
<b>MONEL</b>	RPN-910	RPN-911	RPN-921	RPN-925	RPN-930	RPN-940	RPN-950

Applicable codes

API 1650

API 1104

NAVSHIPS 250-1500

ASTM E 1742 (replaces MIL-STD 453C)

T9074-AS-GIB-010/271 (replaces MIL-STD 271F)

ASME Sec V

ASTM E 142-72

ASTM E 1025

AWS D2.0 – 71

AWS D10.9- 71

MIL-R-11471

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**

**EMAIL: sales@detek.com**

# DETEK, INC

## RADIOGRAPHIC PRODUCTS



# TABLE OF CONTENTS

PENETRAMETER INFORMATION	1 THRU 5
PENETRAMETER SETS & CASES	6 , 7
NOTCHING SYSTEM	8
PENETRAMETER SPECIFICATIONS:	
ASME SEC. I, III, V, VII, SE 1025	9
ASTM-E-1025	10
ASTM-E-1742 (FORMERLY MIL-STD-453C)	11
T9074-AS-GIB-010/271 (FORMERLY MIL-STD-271F)	12
NAVSEA 250-1500-1	13
MIL-R-11471 (ORD)	14
API 1104	15 , 16
API 5L	17 , 18
API 650	18
AWS D1.1-96 (AMERICAN WELDING SOCIETY)	18
AWWA D100-96 (AMERICAN WATER WORKS ASSOC.)	18
ASTM-E-801 (SEMI-CONDUCTOR)	19
ASTM-E-747 WIRE TYPE I.Q.I.S	20
EN 462-1 WIRE TYPE I.Q.I.S	21
PRATT & WHITNEY AIRCRAFT AMS 2635; XRM-1; P&WA TAM I.Q.I.S	22 , 23, 24
CONTRAST SENSITIVITY GAGES - ASTM E 1647	25
MOUNTING BLOCKS	26
SHIMS	26
API 1104 COMPARATOR SHIMS	27
NAVSHIP SLOTTED SHIMS	27
STEP WEDGES	28
LEAD FIGURES	29

# **IMAGE QUALITY INDICATORS**

DETEK, Inc provides precision I.Q.I.s that rigidly conform to and exceed requirements of each code and MIL-spec. Lead figures identifying the penetrometer size and in the case of some MIL specs, the material, are affixed to the penetrometer. Each penetrometer is chemically etched identifying the material and specification.

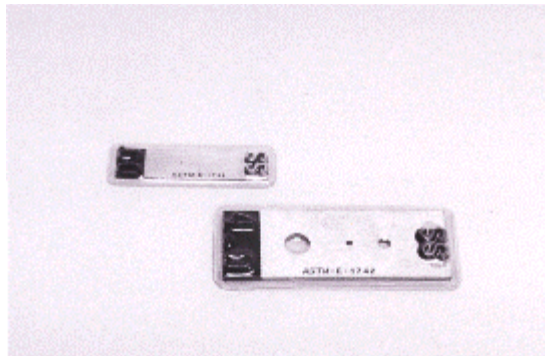
Sharp, smooth edges with accurate, perfectly spaced drilled and reamed holes, ultrasonically cleaned, give the technician every advantage in obtaining clear, well defined images on the radiograph. Copies of material certifications are available on request. All penetrameters are accompanied by a certificate of conformity. The quality control system complies with ISO 9002 (replaces MIL-I-45208A) and ANSI-NCSL-Z540 (replaces MIL-STD-45662-A) and is traceable to the National Institute of Standards and Technology (NIST).

## **SPECIAL CALIBRATION**

I.Q.I.s may be serialized and calibrated resolving to the 4<sup>th</sup> decimal, for a nominal charge.

## **I.Q.I. ENCAPSULATION**

Penetrameters may be encapsulated in clear, thin walled plastic if requested. This leaves I.Q.I.s hermetically sealed by vacuum heat sealing. Cost is nominal.





# IMAGE QUALITY INDICATORS

## **STOCK I.Q.I.s**

Stock penetrameters (IQIs) are available for prompt shipment. Stock penetrameters are standard sizes within each code and of the material listed below.

## STOCK I.Q.I.s CODES AND MIL-SPECS

ASME (ALL CODES)	ASTM-E 1025 (Plaque type)
T9074-AS-GIB-010/271 (Formerly MIL-STD-271F)	ASTM-E-747 (Wire type)
MIL-R-11471	EN462-1(European wire type) (Formerly DIN)
API (ALL CODES)	AWS
ASTM-E-1742 (Formerly MIL-STD-453)	AWWA
NAVSEA 250-1500-1	PRATT & WHITNEY TAMs
	PRATT & WHITNEY AMS 2635 C

## STOCK I.Q.I. MATERIALS

ALUMINUM (6061)	ALUMINUM- BRONZE
BRASS	COPPER
CUPRO-NICKEL (70-30)	INCONEL 600
MAGNESIUM (AZ-31)	MONEL 400
STEEL (1018)	STAINLESS STEEL (304)
TITANIUM (CP & 6-4)	ZIRCONIUM
HAYNES 25 (COBALT)	COMPOSITES (Graphite , Silica, etc.)
HASTELLOYS (B, C, X)	

## I.Q.I SIZES

In accordance with MIL-specs, the size of the penetrameter is identified by two (2) lead numbers cemented to the penetrameter. These lead numbers represent the two (2) significant digits of the decimal equivalent of the maximum thickness of section to be radiographed. In the case API, ASME, ASTM, and AWS codes, these are identified by a number representing the thickness of the penetrameter itself. Thus a penetrameter with a thickness of .005" is identified as a #5.

## INCREMENTS

Penetrameters are manufactured in the following increments:

1/16" thru 1".....	1/16"
1" thru 2 1/2".....	1/8"
2 1/2" and larger.....	1/4"

## COLOR CODE

Penetrameter materials are indicated by color code:

Stainless Steel.....	Red
Steel.....	Orange
Aluminum.....	Blue
Magnesium.....	Yellow
Nickel, and Nickel based alloys..... (Inconel, Hastelloy, Monel, etc.)	Green
Copper, Cupro-Nickel.....	Copper
Brasses, and Bronzes.....	Silver
Cobalt, Titanium, ..... Zirconium, Niobium(Columbium)	Brown

## SPECIAL I.Q.I.s

Special penetrameters are regularly manufactured to customers specifications. Quotations will be made when drawings or specifications are received. Delivery of special penetrameters is usually within ten (10) days of the order.

# **ADDITIONAL MATERIALS & SPECIFICATIONS**

I.Q.Is conforming to specifications or of materials not included in the lists of stock items on page one are made to order as required. Penetrators of nearly any known material and to any U.S. specification can quickly be manufactured in our shops.

I.Q.Is can be readily manufactured from the following materials:

NIOBIUM (COLUMBIUM)	HAFNIUM
HERCULOY	LEAD (PURE)
MAG-THORIUM	MOLYBDENUM
NICKEL ALLOYS	PHOSPHOR-BRONZE (VALVE BRONZE)
RENE 41	SILVER
TANTALUM	STEEL (MARAGING)
BERYLLIUM COPPER	ZIRCALOY (2, and 4)
WASPALOY	ALL COMPOSITES
HAYNES COBALT ALLOYS	

In addition to those materials listed above, I.Q.Is of unusual materials can be manufactured from materials, both metals and non-metals, of which some stock is maintained. However, when I.Q.Is are to be of very unusual material it is usually more advantageous to the customer to supply such material.

Most specifications do not require I.Q.Is to be of the identical alloy as that of the object being radiographed. It is usually only necessary that they be of the same material, having approximately the same density and radiation absorption.

# MATERIALS IDENTIFICATION

Most codes and specifications require that penetrimeters, of all materials, shall have suitable permanent identification marks so as to be distinguished with respect to materials. In some cases (such as ASTM-E-1742; NAVSEA) it is also required that the penetrimeter be identified as to the predominant constituent of the penetrimeter, by utilizing the chemical symbol. In the case of ASTM E 1742, the material is to be identified by two lead letters permanently affixed to the penetrimeter.

## CHEMICAL SYMBOLS USED FOR MATERIAL IDENTIFICATION

### STOCK MATERIALS

AB:	ALUMINUM BRONZE	AL:	ALUMINUM
BR:	BRASS	CU:	COPPER
CU:	CUPRO - NICKEL	CU:	PHOSPHOR BRONZE
FE:	STEEL	IN:	INCONEL
MG:	MAGNESIUM	NI:	NICKEL
NI:	HASTELLOYS (B, C, X)	NI:	MONEL
SS:	STAINLESS STEEL	TI:	TITANIUM

### SPECIAL & EXOTIC MATERIALS

AG:	SILVER	BE:	BERYLLIUM
CB:	COLUMBIUM (NIOBIUM)	CU:	BERYLLIUM - COPPER
HE:	HERCULOY	HF:	HAFNIUM
MO:	MOLYBDENUM	MT:	MAGNESIUM - THORIUM
NI:	RENE 41	NI:	WASPALOY
PB:	LEAD	TA:	TANTALUM
ZR:	ZIRCONIUM	ZR:	ZIRCALOY

In order to expedite shipment and minimize delay of any order, the following must be furnished at the time the order is received:

Code or Spec.,  
Material,  
Size,  
Quantity



# **PENETRAMETERS IN SETS**

## **ASTM-E-1742**

(Formerly MIL- STD 453)

Two standard penetrameter sets are available from stock.

Set “A” consists of twenty-five I.Q.I.s and contains the following sizes:

**.25, .31, .37, .43, .50, .56, .62, .68, .75, .81, .87, .93,  
1.0, 1.1, 1.2, 1.3, 1.5, 1.6, 1.7, 1.8, 2.0, 2.1, 2.2, 2.3, 2.5**

Set “B” consists of eleven I.Q.I.s and contains the following sizes:

**2.7, 3.0, 3.2, 3.5, 3.7, 4.0, 4.5, 5.0, 6.0, 7.0, 8.0**

## **ASTM & ASME**

Two standard penetrameter sets are available from stock.

Set “A” consists of twenty-five I.Q.I.s and contains the following sizes:

**#5, #6, #7, #9, #10, #11, #12, #13, #15, #16, #17, #18, #20,  
#22, #25, #27, #30, #32, #35, #37, #40, #42, #45, #47, #50**

Set “B” consists of eleven I.Q.I.s and contains the following sizes:

**#55, #60, #65, #70, #75, #80, #90, #100, #120, #140, #160**

## **NAVSEA T9074-AS-GIB-010/271**

(formerly MIL-STD-271 F),

## **NAVSHIPS 250-1500-1**

Two standard penetrameter sets are available from stock.

Set “A” consists of twenty-eight I.Q.I.s and contains the following sizes:

**.25, .30, .35, .40, .45, .50, .55, .60, .65, .70, .75, .80, .85, .90, .95  
1.0, 1.1, 1.2, 1.3, 1.5, 1.6, 1.7, 1.8, 2.0, 2.1, 2.2, 2.3, 2.5,**

Set “B” consists of eleven I.Q.I.s and contains the following sizes:

**2.7, 3.0, 3.2, 3.5, 3.7, 4.0, 4.5, 5.0, 6.0, 7.0, 8.0**

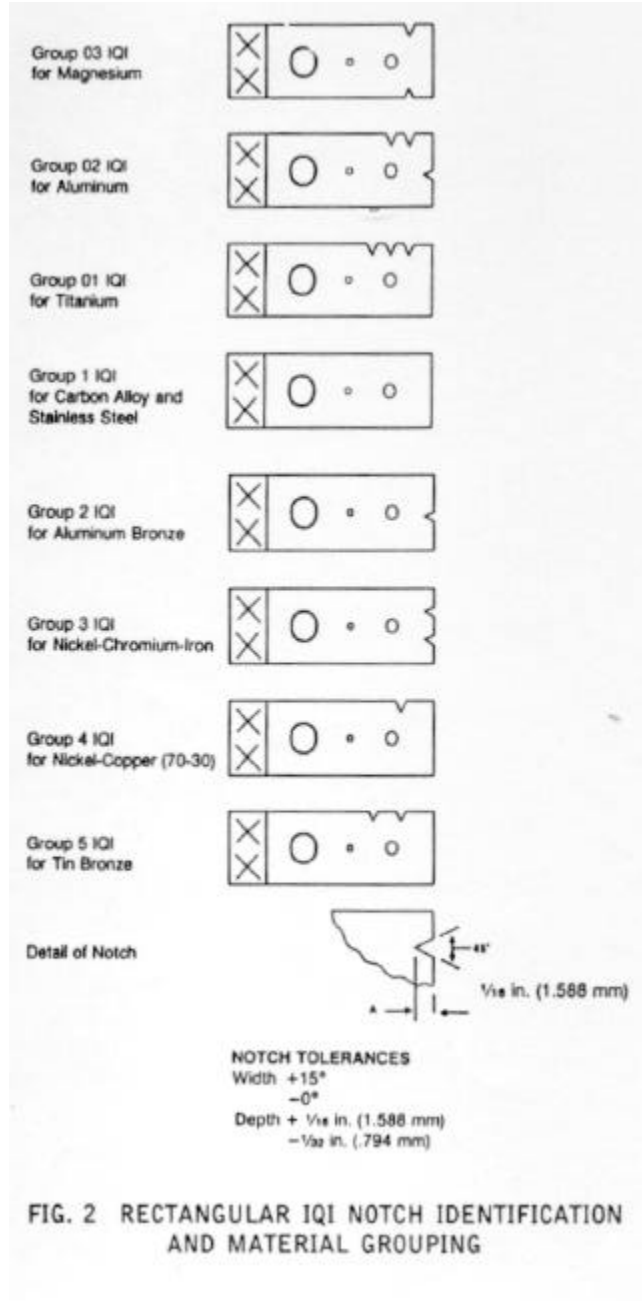
## PENETRAMETER CASES

Penetrameter cases are available for the penetrameters you now have, and are engineered to prevent loss and damage. They are handsomely styled, and constructed of solid Philippine mahogany with a hand-rubbed finish. Each case is provided with shock absorbing sponge rubber in the lid to keep penetrameters firmly in place.



# NOTCHING SYSTEM:

This notching system applies to ASME SE 1025; ASTM-E-1025; NAVSEA T9074 -AS-GIB-010/271; and NAVSEA 250-1500-1 specs.



# ASME SEC.V SE 1025

All ASME sections reference ASME Sec. V SE 1025 (identical to ASTM-E-1025).

## IDENTIFICATION:

A notching system for eight grades of penetrameters is used for identification of rectangular penetrameters on the radiograph. These grades are grouped according to their increasing attenuation. The thickness of the penetrameter is identified by lead numbers. The penetrameters are further identified by electro-chemically etching the material, and spec.

## I.Q.I. SELECTION:

Penetrameter selection for use in accordance with ASME Sec V. is determined using table T-276 in article 2, shown below.

Nominal Single-Wall Material Thickness Range, in.	IQI			
	Source Side		Film Side	
	Hole-Type Designation	Wire-Type Essential Wire	Hole-Type Designation	Wire-Type Essential Wire
Up to 0.25, incl.	12	5	10	4
Over 0.25 through 0.375	15	6	12	5
Over 0.375 through 0.50	17	7	15	6
Over 0.50 through 0.75	20	8	17	7
Over 0.75 through 1.00	25	9	20	8
Over 1.00 through 1.50	30	10	25	9
Over 1.50 through 2.00	35	11	30	10
Over 2.00 through 2.50	40	12	35	11
Over 2.50 through 4.00	50	13	40	12
Over 4.00 through 6.00	60	14	50	13
Over 6.00 through 8.00	80	16	60	14
Over 8.00 through 10.00	100	17	80	16
Over 10.00 through 12.00	120	18	100	17
Over 12.00 through 16.00	160	20	120	18
Over 16.00 through 20.00	200	21	160	20

See TABLE 1 "WIRE IQI SIZES AND WIRE IDENTITY NUMBERS" on page 20 to select wire IQI as determined by essential wire required.



# ASTM-E-1025



## IDENTIFICATION:

A notching system for eight grades of penetrators is used for identification of rectangular penetrators on the radiograph. These grades are grouped according to their increasing attenuation. The thickness of the penetrator is identified by lead numbers. The penetrators are further identified by electro-chemically etching the material, and spec.

## GENERAL DIMENSIONS:

SIZE	LENGTH	WIDTH
#50 & smaller	1 1/2"	1/2"
over #50 to #160 incl.	2 1/4"	1"
Over #160	Diameter is equal to 4 x thickness	
	(Number of holes: 2 )	

## THICKNESS:

Penetrator thickness is determined by image quality level required using the table below. The industry standard is 2% of the thickness to be radiographed, to the nearest fractional size.  
Minimum thickness: .005"

Standard Image Quality Levels			
Image Quality Levels	IQI Thickness	Minimum Preceptible Hole Diameter	Equivalent IQI Sensitivity, % <sup>B</sup>
2-1T	$\frac{1}{50}$ (2%) of Specimen Thickness	1T	1.4
2-2T <sup>A</sup>		2T	2.0
2-4T		4T	2.8
Special Image Quality Levels			
1-1T	$\frac{1}{100}$ (1%) of Specimen Thickness	1T	0.7
1-2T		2T	1
4-2T	$\frac{1}{25}$ (4%) of Specimen Thickness	2T	4

<sup>A</sup>For Level 2-2T Radiologic — The 2T hole in an IQI,  $\frac{1}{50}$  (2%) of the specimen thickness, is visible.  
<sup>B</sup>Equivalent IQI sensitivity is that thickness of the IQI, expressed as a percentage of the part thickness, in which the 2T hole would be visible under the same conditions.

## HOLE SIZES:

Small hole dia.:	1 X THICKNESS	(min: .010")
Medium hole dia.:	2 X THICKNESS	(min: .020")
Large hole dia.:	4 X THICKNESS	(min: .040")

# **ASTM-E-1742**

(FORMERLY MIL-STD-453)



## **IDENTIFICATION:**

Lead figures identify the thickness of the material to be radiographed on one end, and the material of the penetrameter on the other end.

## **GENERAL DIMENSIONS:**

SIZE	LENGTH	WIDTH
2.5" & smaller	2"	1/2"
2.6" to 8"	2.850"	1"
Over 8"	Diameter equal to 4 X Thickness (Number of holes: 2)	

## **THICKNESS:**

2 % of the thickness of the material to be radiographed, to the nearest fractional size.  
Minimum thickness: .005"

## **HOLE SIZES:**

Small hole dia.	1 X THICKNESS	(min: .010")
Medium hole dia.	2 X THICKNESS	(min: .020")
Large hole dia.	4 X THICKNESS	(min: .040")

# NAVSEA T9074-AS-GIB-010/271

FORMERLY MIL-STD-271 F



## IDENTIFICATION:

A notching system for eight grades of penetrators is used for identification of rectangular penetrators on the radiograph. These grades are grouped according to their increasing attenuation. Lead figures identify the thickness of the material to be radiographed. The penetrator is further identified by electro-chemically etching the material and the spec.

## GENERAL DIMENSIONS:

SIZE	LENGTH	WIDTH
2.5" & smaller	1 1/2"	1/2"
2.6" to 8"	2 1/4"	1"
Over 8"	Diameter equal to 4 X Thickness (Number of holes: 2)	

## THICKNESS:

2 % of the thickness of the material to be radiographed, to the nearest fractional size.  
Minimum thickness: .005"

## HOLE SIZES:

Small hole dia.	1 X THICKNESS	(min: .010")
Medium hole dia.	2 X THICKNESS	(min: .020")
Large hole dia.	4 X THICKNESS	(min: .040")

# NAVSEA 250-1500-1



## IDENTIFICATION:

A notching system as listed below is used for identification of rectangular penetrators on the radiograph. These grades correspond with the notching system listed before and are grouped according to their increasing attenuation. Lead figures identify the thickness of the material to be radiographed. The penetrator is further identified by electro-chemically etching the material and the spec.

## NOTCHING SYSTEM:

GROUP I	Steel, Stainless steel, Manganese	No notches
GROUP II	Aluminum-Bronze; Nickel-Aluminum-Bronze	1 notch on end
GROUP III	Inconel	2 notches on end
GROUP IV	Nickel, Copper, Monel, Cupro-Nickel	1 notch on top edge
GROUP V	Tin Bronze, Valve Bronze	2 notches on top edge

## GENERAL DIMENSIONS:

SIZE	LENGTH	WIDTH
2.5" & smaller	1 1/2"	1/2"
2.6" to 8"	2 1/4"	1"
Over 8"	Diameter equal to 4 X Thickness (Number of holes: 2)	

## THICKNESS:

2 % of the thickness of the material to be radiographed, to the nearest fractional size.  
Minimum thickness: .005"

## HOLE SIZES:

Small hole dia.	1 X THICKNESS	(min: .010")
Medium hole dia.	2 X THICKNESS	(min: .020")
Large hole dia.	4 X THICKNESS	(min: .040")



**U. S. ARMY ORDNANCE**  
**MIL-R-11471-3**

**GENERAL DIMENSIONS:**

SIZE	LENGTH	WIDTH
2.5" & smaller	1 1/2"	1/2"
2.6" to 8"	2 1/4"	1"
Over 8"	Diameter equal to 4 X Thickness (Number of holes: 2)	

**THICKNESS:**

2 % of the thickness of the material to be radiographed, to the nearest fractional size.  
Minimum thickness: .005"

**HOLE SIZES:**

Small hole dia.	1 X THICKNESS	(min: .010")
Medium hole dia .	2 X THICKNESS	(min: .020")
Large hole dia.	4 X THICKNESS	(min: .040")

# API 1104 PIPELINE

API 1104 specifies the use of penetrameters conforming to requirements of either ASTM-E-142\* , or “figure 20” for hole type penetrameters, or ASTM-E-747 for wire type penetrameters. Penetrometer selection is determined by the set of requirements to be used as shown in tables 5, 6, & 7.

\*ASTM-E-1025 supercedes ASTM-E-142 for penetrometer design.

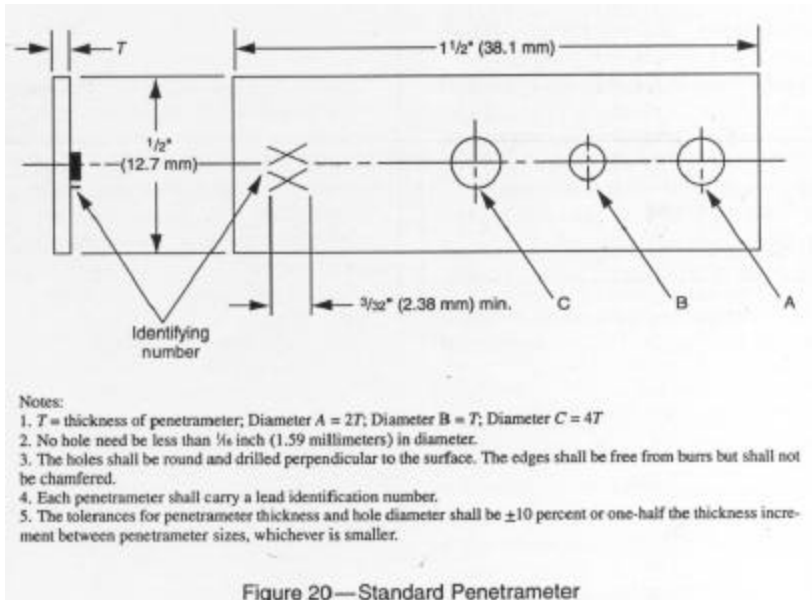
## GENERAL DIMENSIONS:

SIZE	LENGTH	WIDTH
#50 & smaller	1 1/2"	1/2"
Over #50 to #160	2 1/4"	1"
Over #160	Diameter equal to 4 X Thickness	(Number of holes: 2)

**Table 6—Thickness of Pipe Versus Thickness of Penetrometer\***

Pipe Wall or Weld Thickness		Maximum Penetrometer Thickness		Identifying Number
Inches	Millimeters	Inches	Millimeters	
0–¼	0–6.35	0.005	0.127	5
>¼–⅜	>6.35–9.52	0.0075	0.19	7
>⅜–½	>9.52–12.70	0.010	0.254	10
>½–¾	>12.70–15.88	0.0125	0.317	12
>¾–1	>15.88–19.05	0.015	0.381	15
>1–1¼	>19.05–22.22	0.0175	0.444	17
>1¼–1½	>22.22–25.40	0.020	0.508	20
>1½–1¾	>25.40–31.75	0.025	0.635	25
>1¾–2	>31.75–38.10	0.030	0.762	30
		0.035	0.889	35

\* See Figure 20.



# API 1104 PIPE LINE

CONTINUED

**Table 5—Thickness of Pipe Versus Thickness of ASTM E 142 Penetrameter**

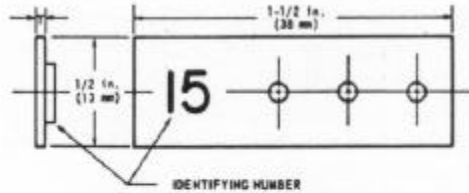
Pipe Wall or Weld Thickness		Maximum Penetrameter Thickness		Identifying Number
Inches	Millimeters	Inches	Millimeters	
0–¼	0–6.35	0.0125	0.317	12
>¼–¾	>6.35–9.52	0.015	0.381	15
>¾–1	>9.52–12.70	0.0175	0.444	17
>1–1½	>12.70–19.05	0.020	0.508	20
>1½–2	>19.05–25.40	0.025	0.635	25
>2–2½	>25.40–50.80	0.030	0.762	30

**Table 7—Thickness of Pipe Versus Diameter of ASTM E 747 Wire Penetrameter**

Weld Thickness		Essential Weld Diameter		ASTM Set Letter
Inches	Millimeters	Inches	Millimeters	
0–¼	0–6.35	0.008	0.20	A
>¼–¾	>6.35–9.52	0.010	0.25	A or B
>¾–1	>9.52–12.70	0.013	0.33	B
>1–1½	>12.70–19.05	0.016	0.41	B
>1½–2	>19.05–25.40	0.020	0.51	B
>2–2½	>25.40–50.80	0.025	0.64	B

# API 5L

API 5L specifies the use of penetrameters conforming to “figure 6” as shown below. Penetrameter selection is determined by the set of requirements to be used as shown in tables 14, & 15.



**Notes:**

1. The diameter of each hole shall be  $\frac{1}{16}$  in. (1.6 mm).
2. Holes shall be round and drilled perpendicular to the surface.
3. Holes shall be free of burrs, but edges shall not be chamfered.
4. Each penetrameter shall carry a lead identification number as given in Tables 14 and 15.

Figure 6—API Standard Penetrameter

Table 14—API Standard 4 Percent Penetrameters

(1)		(2)		(3)		(4)
Wall Thickness				Maximum Penetrameter Thickness		Identifying Number
Over		Through				
in.	mm	in.	mm	in.	mm	
$\frac{3}{16}$ or 0.188	(4.8)	$\frac{1}{4}$ or 0.250	(6.4)	0.010	(0.25)	10
$\frac{1}{4}$ or 0.250	(6.4)	$\frac{3}{16}$ or 0.313	(7.9)	0.0125	(0.32)	12
$\frac{5}{16}$ or 0.313	(7.9)	$\frac{3}{8}$ or 0.375	(9.5)	0.015	(0.38)	15
$\frac{3}{8}$ or 0.375	(9.5)	$\frac{7}{16}$ or 0.438	(11.1)	0.0175	(0.45)	17
$\frac{7}{16}$ or 0.438	(11.1)	$\frac{1}{2}$ or 0.500	(12.7)	0.020	(0.51)	20
$\frac{1}{2}$ or 0.500	(12.7)	$\frac{5}{8}$ or 0.625	(15.9)	0.025	(0.64)	25
$\frac{5}{8}$ or 0.625	(15.9)	$\frac{3}{4}$ or 0.750	(19.1)	0.030	(0.76)	30
$\frac{3}{4}$ or 0.750	(19.1)	1 or 1.000	(25.4)	0.040	(1.02)	40
1 or 1.000	(25.4)	$1\frac{1}{4}$ or 1.250	(31.8)	0.050	(1.27)	50
$1\frac{1}{4}$ or 1.250	(31.8)	$1\frac{1}{2}$ or 1.500	(38.1)	0.060	(1.52)	60

Table 15—API Standard 2 Percent Penetrameters

(1)		(2)		(3)		(4)
Wall Thickness				Maximum Penetrameter Thickness		Identifying Number
Over		Through				
in.	mm	in.	mm	in.	mm	
$\frac{7}{32}$ or 0.219	(5.1)	$\frac{1}{4}$ or 0.250	(6.4)	0.005	(0.13)	5
$\frac{1}{4}$ or 0.250	(6.4)	$\frac{5}{16}$ or 0.313	(7.9)	0.006	(0.15)	6
$\frac{3}{16}$ or 0.313	(7.9)	$\frac{3}{8}$ or 0.375	(9.5)	0.0075	(0.19)	7
$\frac{3}{8}$ or 0.375	(9.5)	$\frac{1}{2}$ or 0.500	(12.7)	0.010	(0.25)	10
$\frac{1}{2}$ or 0.500	(12.7)	$\frac{5}{8}$ or 0.625	(15.9)	0.0125	(0.32)	12
$\frac{3}{8}$ or 0.625	(15.9)	$\frac{3}{4}$ or 0.750	(19.1)	0.015	(0.38)	15
$\frac{3}{4}$ or 0.750	(19.1)	$\frac{7}{8}$ or 0.875	(22.2)	0.0175	(0.45)	17
$\frac{7}{8}$ or 0.875	(22.2)	1 or 1.000	(25.4)	0.020	(0.51)	20
1 or 1.000	(25.4)	$1\frac{1}{4}$ or 1.250	(31.8)	0.025	(0.64)	25
$1\frac{1}{4}$ or 1.250	(31.8)	$1\frac{1}{2}$ or 1.500	(38.1)	0.030	(0.76)	30



# API 5L

CONTINUED

## WIRE IQIs (EN TYPE)

Wire type IQI selection is determined by the requirements of tables 16, & 17.

**Table 16—ISO Wire 4 Percent Penetrators**

(1) Wire Number	(2) Wall Thickness				(4) Wire Diameter	
	Over		Through		in.	mm
	in.	mm	in.	mm		
$Fe^{1/7}$						
1	2.50	(63.5)	3.25	(82.6)	.13	(3.20)
2	2.00	(50.8)	2.50	(63.5)	.10	(2.50)
3	1.62	(41.1)	2.00	(50.8)	.08	(2.00)
4	1.25	(31.8)	1.62	(41.1)	.065	(1.60)
5	1.00	(25.4)	1.25	(31.8)	.050	(1.25)
6	0.80	(20.3)	1.00	(25.4)	.040	(1.00)
7	0.63	(15.9)	0.80	(20.3)	.032	(0.80)
$Fe^{6/12}$						
6	0.800	(20.3)	1.000	(25.4)	.040	(1.00)
7	0.625	(15.9)	0.800	(20.3)	.032	(0.80)
8	0.500	(12.7)	0.625	(15.9)	.025	(0.63)
9	0.400	(10.2)	0.500	(12.7)	.020	(0.50)
10	0.325	(8.3)	0.400	(10.2)	.016	(0.40)
11	0.250	(6.4)*	0.325	(8.3)	.013	(0.32)
12	0.200	(5.1)	0.250	(6.4)	.010	(0.25)
$Fe^{10/16}$						
10	0.325	(8.3)	0.400	(10.2)	.016	(0.40)
11	0.250	(6.4)	0.325	(8.3)	.013	(0.32)
12	0.200	(5.1)	0.250	(6.4)	.010	(0.25)
13	0.162	(4.1)	0.200	(5.1)	.008	(0.20)
14	0.125	(3.2)	0.162	(4.1)	.006	(0.16)
15	0.100	(2.5)	0.125	(3.2)	.005	(0.13)
16	0.080	(2.0)	0.100	(2.5)	.004	(0.10)

**Table 17—ISO Wire 2 Percent Penetrators**

(1) Wire Number	(2) Wall Thickness				(4) Wire Diameter	
	Over		Through		in.	mm
	in.	mm	in.	mm		
$Fe^{1/7}$						
1	5.00	(127.0)	6.50	(165.2)	.13	(3.20)
2	4.00	(101.6)	5.00	(127.0)	.10	(2.50)
3	3.25	(82.6)	4.00	(101.6)	.08	(2.00)
4	2.50	(63.5)	3.25	(82.6)	.065	(1.60)
5	2.00	(50.8)	2.50	(63.5)	.050	(1.25)
6	1.60	(40.6)	2.00	(50.8)	.040	(1.00)
7	1.25	(31.8)	1.60	(40.6)	.032	(0.80)
$Fe^{6/12}$						
6	1.600	(40.6)	2.00	(50.8)	.040	(1.00)
7	1.250	(31.8)	1.60	(40.6)	.032	(0.80)
8	1.000	(25.4)	1.250	(31.8)	.025	(0.63)
9	0.800	(20.3)	1.000	(25.4)	.020	(0.50)
10	0.650	(16.5)	0.800	(20.3)	.016	(0.40)
11	0.500	(12.7)	0.650	(16.5)	.013	(0.32)
12	0.400	(10.1)	0.500	(12.7)	.010	(0.25)
$Fe^{10/16}$						
10	0.625	(16.2)	0.800	(20.3)	.016	(0.40)
11	0.500	(12.7)	0.650	(16.2)	.013	(0.32)
12	0.400	(10.1)	0.500	(12.7)	.010	(0.25)
13	0.325	(8.3)	0.400	(10.1)	.008	(0.20)
14	0.250	(6.4)	0.325	(8.3)	.006	(0.16)
15	0.200	(5.1)	0.250	(6.4)	.005	(0.13)
16	0.160	(4.1)	0.200	(5.1)	.004	(0.10)

# API 650

## AWS D1.1-96

## AWWA D100-96

API 650 (TENTH EDITION: NOVEMBER 1998); AWS D1.1-96; AWWA D100-96 specify that the radiographic method employed shall be in accordance with ASME sec. V, article 2

# ASTM-E-801

## SEMI-CONDUCTOR IQIs

### USE:

Controlling quality of radiological examination of electronic devices.

### SCOPE:

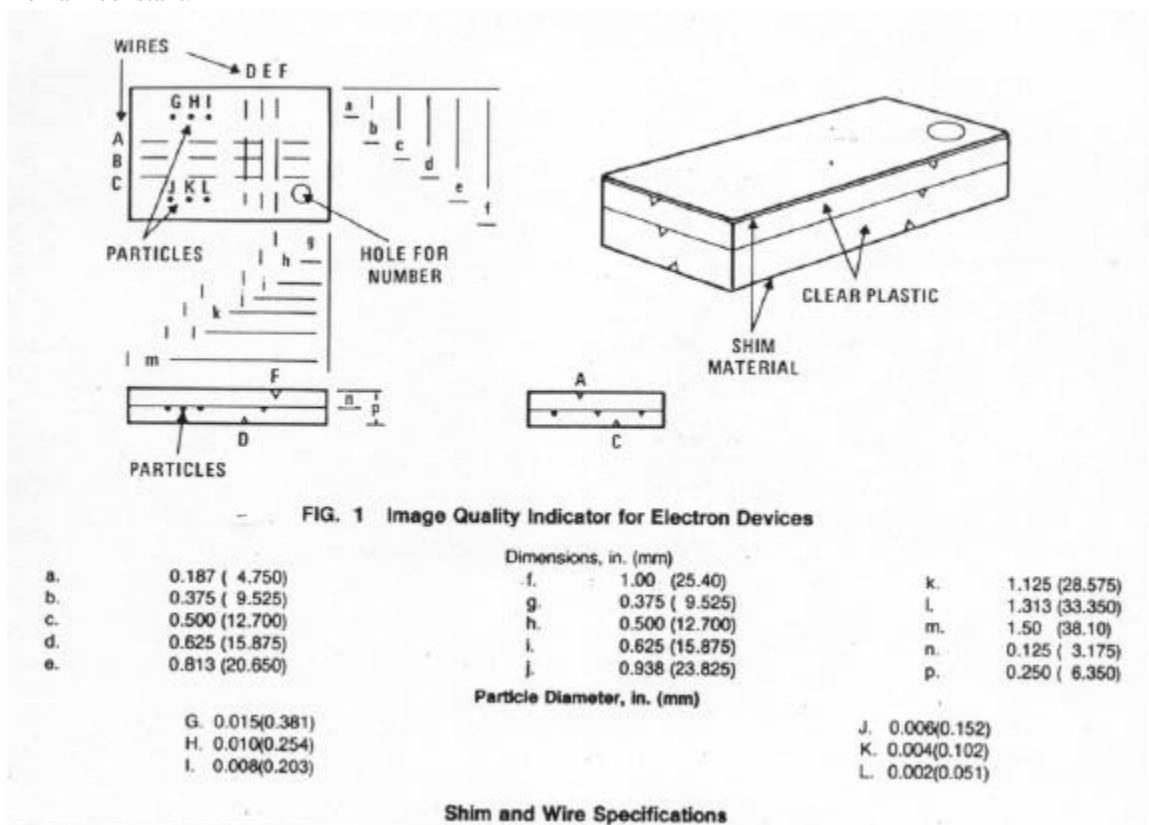
ASTM-E-801 relates to the radiological examination of electronic devices for internal discontinuities, extraneous material, missing components, crimped or broken wires, and defective solder joints, in cavities in the encapsulating materials, or the boards.

### IQIs:

IQIs shall be fabricated of clear acrylic plastic with steel covers, lead spheres gold or tungsten wires, and lead numbers. They shall be accompanied by calibration sheets listing actual physical wire placements.

### APPLICATION:

The function of this type of IQI is to simulate as closely as possible the device being examined. A set of eight IQIs having a range of wire diameters and cover thicknesses (steel shim stock) provide for a range of radiological equivalences to the range of devices from glass diodes or plastic-encapsulated circuits (number one) to large power or hybrid circuit devices (number eight). Wire size increases with shim stock thickness because the higher power devices, which are radiologically compatible with the thicker coverings, normally use larger interconnecting wires than small signal devices which use the thin coverings. Particle size is normally independent of device type, so these remain constant.



# WIRE TYPE IQIs

## ASTM E 747 - 97

Accepted by ASME V and AWS as an alternative to plaque type IQIs. These penetrameters are encapsulated in vinyl for durability. Available in 4 sizes (Sets A, B, C, and D) in Aluminum, Copper, and Stainless Steel. Also available in Sets A and B are Inconel and Titanium.

ASTM-E-747 wire type IQIs are manufactured with 6 wires in each size, as shown in the table below.

SET A		SET B	
Wire Diameter in. (mm)	Wire Identity	Wire Diameter in. (mm)	Wire Identity
0.0032 (0.08) <sup>A</sup>	1	0.010 (0.25)	6
0.004 (0.1)	2	0.013 (0.33)	7
0.005 (0.13)	3	0.016 (0.4)	8
0.0063 (0.16)	4	0.020 (0.51)	9
0.008 (0.2)	5	0.025 (0.64)	10
0.010 (0.25)	6	0.032 (0.81)	11
SET C		SET D	
Wire Diameter in. (mm)	Wire Identity	Wire Diameter in. (mm)	Wire Identity
0.032 (0.81)	11	0.10 (2.5)	16
0.040 (1.02)	12	0.126 (3.2)	17
0.050 (1.27)	13	0.160 (4.06)	18
0.063 (1.6)	14	0.20 (5.1)	19
0.080 (2.03)	15	0.25 (6.4)	20
0.100 (2.5)	16	0.32 (8)	21

<sup>A</sup> The 0.0032 wire may be used to establish a special quality level as agreed upon between the purchaser and the supplier.

Each size IQI covers a range of thicknesses for which it is used, based on a standard 2T level of inspection.

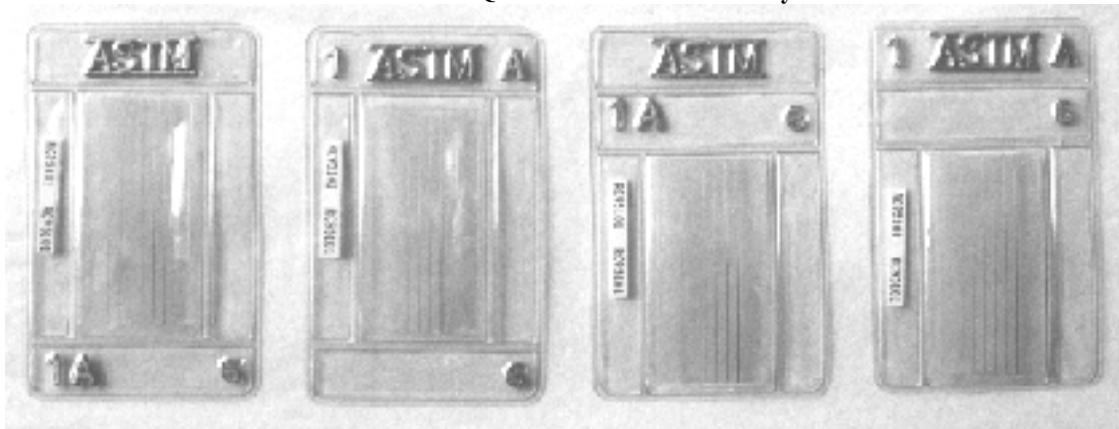
### IQI SIZE

- SET A
- SET B
- SET C
- SET D

### THICKNESS RANGE

- .25 THRU .75 IN.
- .75 THRU 1.7 IN.
- 1.7 THRU 4.0 IN.
- 4.0 THRU 10.0 IN

ASTM-E-747 IQIs are available in four styles as shown



### **STYLE 1**

### **STYLE 1.1**

### **STYLE 2**

### **STYLE 3**

STYLE 1 and STYLE 2 carry the same designation as “Alternate 1” and “Alternate 2” respectively as shown in the ASTM Book of Standards

# EN 462-1 WIRE TYPE IQIs

FORMERLY DIN 54.109

Published by European committee for standardization; EN-462-1 replaces DIN 54.109.

Based on a series of wire diameters, subdivided into ranges of 7 wires. The lead symbol identifies the largest wire, material and "EN" specification.

EN 462-1 IQIs are available in STEEL, ALUMINUM, and COPPER in sizes 1 EN, 6EN, 10 EN, and 13 EN, and TITANIUM in sizes 6 EN and 10 EN.

<b>1 EN</b>			<b>6EN</b>		
WIRE #	WIRE DIAM. mm	WIRE DIAM in.	WIRE #	WIRE DIAM. mm	WIRE DIAM in.
1	3.20	.1259	6	1.00	.0393
2	2.50	.0984	7	0.80	.0315
3	2.00	.0787	8	0.63	.0248
4	1.60	.0629	9	0.50	.0196
5	1.25	.0492	10	0.40	.0157
6	1.00	.0393	11	0.32	.0126
7	0.80	.0315	12	0.25	.0098

<b>10 EN</b>			<b>13 EN</b>		
WIRE #	WIRE DIAM. mm	WIRE DIAM in.	WIRE #	WIRE DIAM. mm	WIRE DIAM in.
10	0.40	.0157	13	0.20	.0078
11	0.32	.0126	14	0.16	.0063
12	0.25	.0098	15	0.13	.0049
13	0.20	.0078	16	0.10	.0039
14	0.16	.0063	17	0.08	.0031
15	0.13	.0049	18	0.063	.0024
16	0.10	.0039	19	0.05	.0019

<b>IQI SIZE</b>	<b>THICKNESS RANGE</b>					
1 EN	40	thru	160 mm	1.6	thru	6.0 in.
6 EN	12.5	thru	50 mm	.50	thru	2.0 in.
10 EN	5.0	thru	20 mm	.20	thru	.75 in.
13 EN	2.5	thru	10 mm	.10	thru	.40 in.





# **PRATT & WHITNEY PENETRAMEters**

Pratt & Whitney specifies the use of two classifications of penetrameters under the XRM document: TAM specs, and AMS 2635.

TAM specs are tool numbers assigned to penetrameters with a true 2% sensitivity, for use on material sections under .25 in. TAM specs contain detail numbers, each one representing a specific penetrameter thickness. Additionally, TAM specs contain an AMS number, which specifies the material of the penetrameter.

AMS 2635 is used for all materials, for use on sections from .05 in. and up with a minimum IQI thickness of .005 in. For materials not covered by a TAM number, AMS 2635 can be made to true 2% thickness. Specify when ordering, otherwise the standard .005 in. minimum thickness applies.

## **TAM SPECS FOR PENETRAMEters:**

<u>TAM #</u>	<u>MATERIAL</u>	<u>AMS #</u>
108533	STAINLESS STEEL	5640
140607	6AL/4V TITANIUM	4928
142937	HASTELLOY X	5754
142401	HAYNES 25	5759

## **COMMON MATERIALS COVERED UNDER AMS 2635 C IN ADDITION TO THOSE LISTED ABOVE:**

<u>MATERIAL</u>	<u>AMS #</u>
2024 ALUMINUM	4120
ZK60 MAGNESIUM	4352
WASPALLOY	5706

## **MATERIAL VERIFICATION:**

Pratt & Whitney's XRM document specifies the requirement for dimensional and alloy verification.

Dimensions are verified and documented in an analytical report with penetrameters.

Alloy verification is performed in accordance with PWA MCL sec. F-53 (thermo-electric testing).

Material certifications accompany alloy verification document.

Aluminum and Magnesium alloys are sent out for semi-quantitative spectrographic analysis in accordance with PWA MCL sec. F-23 and F-54.

# **PRATT & WHITNEY MOUNTING BLOCKS**

Pratt & Whitney specifies the use TAM specs to which mounting blocks shall conform. TAM specs are tool numbers assigned to mounting blocks. TAM specs contain detail numbers , each one representing a specific mounting block thickness. Additionally, TAM specs contain an AMS number, which specifies the material of the mounting block.

## **TAM SPECS FOR MOUNTING BLOCKS:**

<b><u>TAM #</u></b>	<b><u>MATERIAL</u></b>	<b><u>AMS #</u></b>
97734	2024 ALUMINUM	4120
97735	ZK60 MAGNESIUM	4352
97736	6AL/4V TITANIUM	4928
97737	303 STAINLESS	5640
101017	WASPALLOY	5706
101018	HASTELLOY X	5754
142401	HAYNES 25	5759

## **MATERIAL VERIFICATION:**

Pratt & Whitney's XRM document specifies the requirement for dimensional and alloy verification.

Dimensions are verified and documented in an analytical report with mounting blocks.

Alloy verification is performed in accordance with PWA MCL sec. F-53 (thermo-electric testing).

Material certifications accompany alloy verification document.

Aluminum and Magnesium alloys are sent out for semi-quantitative spectrographic analysis in accordance with PWA MCL sec. F-23 and F-54.

# PRATT & WHITNEY STEP WEDGES

Pratt & Whitney's XRM document specifies step wedges conforming to TAM specs. TAM specs are tool numbers assigned to step wedges specifying material, width and length of the step wedge, step width, and step thicknesses.

## DETAILS:

NUMBER of STEPS:	7
WIDTH (OVERALL):	2 1/4"
LENGTH (OVERALL):	3 15/16"
STEP WIDTH:	9/16"
STEP THICKNESSES:	.050", .075", .100", .125", .150", .200", .250"

## TAM SPECS FOR STEP WEDGES:

<u>TAM #</u>	<u>MATERIAL</u>	<u>AMS #</u>
142395	6AL/4V TITANIUM	4928
142396	303 STAINLESS	5640
142398	WASPALOY	5706
142399	HAYNES 25	5759
142939	HASTELLOY X	5754

## MATERIAL VERIFICATION:

Pratt & Whitney's XRM document specifies the requirement for dimensional and alloy verification.

Dimensions are verified and documented in an analytical report with step wedges.

Alloy verification is performed in accordance with PWA MCL sec. F-53 (thermo-electric testing).

Material certifications accompany alloy verification document.

Aluminum and Magnesium alloys are sent out for semi-quantitative spectrographic analysis in accordance with PWA MCL sec. F-23 and F-54.

# PRATT & WHITNEY X-RAY DENSITY COMPARISON GAGE

## TAM 169526

**GEOMETRY:** 1.0" X 3.0" X .100"

Contains a series of 12, 1/16" diameter flat bottom holes from .005" to .060" deep. Normally manufactured from 6AL/4V TITANIUM, or 410 STAINLESS. Tool and hole numbers are permanently engraved. Housed in Mahogany wood case.

# CONTRAST SENSITIVITY GAGES

## ASTM E 1647

Used in conjunction with a high contrast resolution measuring gage such as a *DUPLEX WIRE IMAGE QUALITY INDICATOR (EN 462 PART 5)*; Contrast sensitivity gages measure contrast sensitivity independent of the imaging system spatial resolution limitations.

Contrast sensitivity gages are manufactured with four precision thickness recesses representing the four levels of contrast sensitivity to be measured- 1, 2, 3 and 4% as shown in figure 1 below. Contrast sensitivity gages are designed with four gage sizes. As tables 1, 2, and 3 indicate, each gage size covers a range of thicknesses.

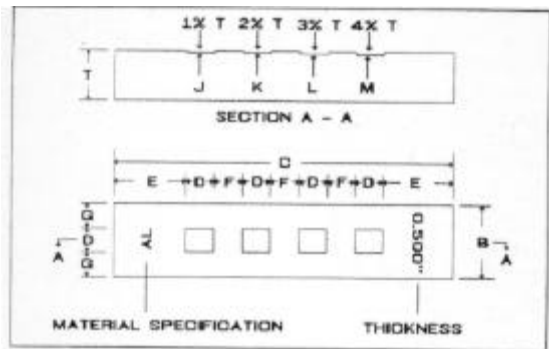


FIG. 1 General Layout of the Contrast Sensitivity Gage

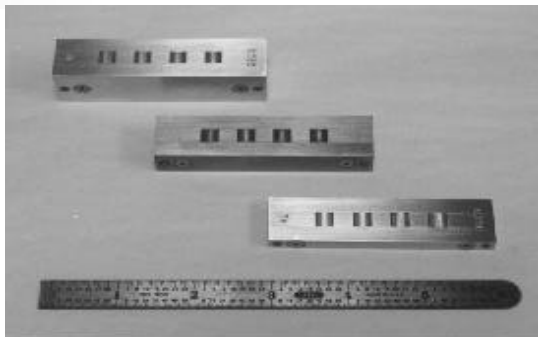


TABLE 1 Design of the Contrast Sensitivity Gage

Gage Thickness	J Recess	K Recess	L Recess	M Recess
T	1 % of T	2 % of T	3 % of T	4 % of T

TABLE 2 Contrast Sensitivity Gage Dimensions

Gage Size	B DIM.	C DIM.	D DIM.	E DIM.	F,G DIM.
1	0.750 in.	3.000 in.	0.250 in.	0.625 in.	0.250 in.
	19.05 mm	76.20 mm	6.35 mm	15.88 mm	6.35 mm
2	1.500 in.	6.000 in.	0.500 in.	1.250 in.	0.500 in.
	38.10 mm	152.40 mm	12.70 mm	31.75 mm	12.7 mm
3	2.250 in.	9.000 in.	0.750 in.	1.875 in.	0.750 in.
	57.15 mm	228.60 mm	19.05 mm	47.63 mm	19.05 mm
4	3.000 in.	12.000 in.	1.000 in.	2.500 in.	1.000 in.
	76.20 mm	304.80 mm	25.40 mm	63.50 mm	25.4 mm

TABLE 3 Contrast Sensitivity Gage Application

Gage Size	Use on Thicknesses
1	Up to 1.5 in. (38.1 mm)
2	Over 1.5 in. (38.1 mm) to 3.0 in. (76.2 mm)
3	Over 3.0 in. (76.2 mm) to 6.0 in. (152.4 mm)
4	Over 6.0 in. (152.4 mm)

Contrast sensitivity gages can be manufactured from in the following materials:

MAGNESIUM	(GROUP 03)
ALUMINUM	(GROUP 02)
TITANIUM	(GROUP 01)
STEEL OR STAINLESS STEEL (300 SERIES)	(GROUP 1)
ALUMINUM BRONZE ALLOY #623 OR #630	(GROUP 2)
NI-CR-FE (INCONEL 600)	(GROUP 3)
70 to 30 NICKEL COPPER (MONEL) or	(GROUP 4)
70 to 30 COPPER NICKEL (CU-NI)	
TIN BRONZE alloy D of B 139	(GROUP 5)

# **MOUNTING BLOCKS**

Mounting blocks are used when it is impractical to place the penetrameter directly on the object being radiographed. Most codes specify that a mounting block of the same material and thickness be placed, with the penetrameter, adjacent to the part in such a manner that it will show clearly on the radiograph. Standard mounting blocks are supplied in sizes corresponding with IQI sizes.

## **GENERAL DIMENSIONS:**

SIZES UP TO 2 1/2" incl.	1.0" X 2 1/4"
SIZES OVER 2 1/2"	1 1/4" X 3.0"

These dimensions allow at least 1/8" clearance on three sides of the IQI.

Standard mounting blocks are available in the following materials:

STEEL	MAGNESIUM
BRASS	STAINLESS STEEL
ALUMINUM	COPPER

Mounting blocks of other materials including, but not limited to, the following materials are made on order:

HASTELLOY X	MAGNESIUM-THORIUM
MONEL	CUPRO-NICKEL
INCONEL	6AL/4V TITANIUM
ALUMINUM BRONZE	HAYNES 25

## **SHIMS**

### **3/4" X 2"**

Some codes require that shims be placed under the penetrameter to compensate for the thickness of a backing ring or weld reinforcement. Shims are supplied in the same materials as penetrameters. They are usually available in increments of 1/16", from 1/16" thick thru 1.0". The general dimension (3/4" x 2") allows approximately 1/8" clearance on each side of the penetrameter they are to be used with. Material and thickness is marked on each shim.

#### **NOTE:**

"SHIMS" (3/4" X 2") ARE NOT TO BE USED FOR APPLICATIONS REQUIRING CONFORMANCE TO ASTM-E-1742 (formerly MIL-STD-453)





# STEP WEDGES

Step wedges are used for the calibration of X-RAY machines and evaluation of techniques. Additionally, when an object with varying thicknesses is radiographed a step wedge of the same material, incorporating the same thicknesses, may often be advantageously used. By placing an IQI on each step, and including the step wedge in the radiograph, the sensitivity may be suitably determined for each thickness.

Standard step wedges, 1" high and 2" or 2 1/4" wide, with 4, 8, or 16 steps are manufactured in all standard materials and are available for prompt delivery. Step wedges of other materials and alloys are made on order. Delivery is within two weeks.

## GENERAL DIMENSIONS:

	<u>4 STEPS</u>	<u>8 STEPS</u>	<u>16 STEPS</u>
STEP HEIGHT:	.250"	.125"	.062"
STEP WIDTH:	.750"	.750"	.500"
STEP WEDGE LENGTH	3.000"	6.000"	8.000"

## SPECIAL STEP WEDGES

Step wedges, with a continuous series of steps, to any height and width are manufactured to customers' specifications. Descriptions or drawings must include the width and length of the step wedge, step dimensions, total number of steps, and total height of the step wedge.

## RISER BLOCKS

Step wedge blocks (riser blocks) increase the effective thickness of the step wedge. The general dimensions correspond with the step wedge for which it is to be used, and the block is 1.0" thick.



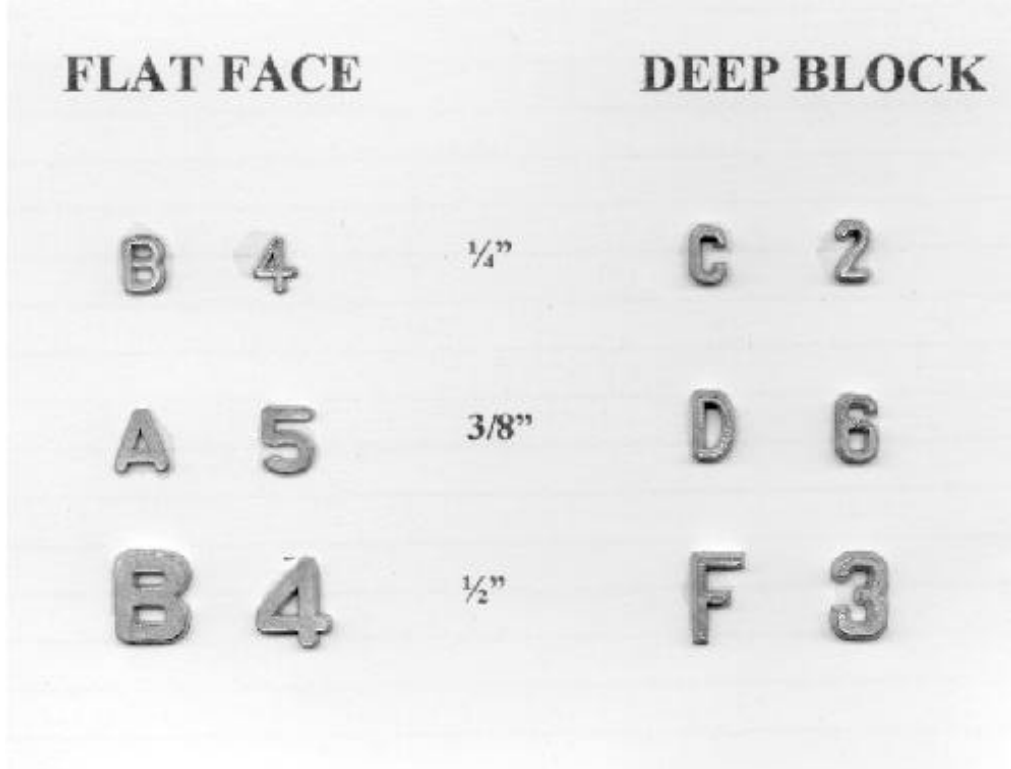
# LEAD NUMBERS AND LETTERS

DETEK precision lead numbers and letters are clean with sharp smooth edges, and produce clear, well defined images.

All types shown below are available in A - Z, and #0 - #9. Immediate delivery from factory stock. Samples available on request. Arrows are also available.

DETEK also offers 36 compartment lead figure cases made of heavy duty plastic.

## COMMON SIZES



### DATA

SIZE	TYPE	THICKNESS	SIZE	TYPE	THICKNESS
1/8"	FLAT FACE	.020" - .025"	1/4"	DEEP BLOCK	5/64"
3/16"	FLAT FACE	.035" - .040"	3/8"	DEEP BLOCK	5/64"
1/4"	FLAT FACE	3/64"	1/2"	DEEP BLOCK	5/64"
3/8"	FLAT FACE	3/64"	3/4"	DEEP BLOCK	3/32"
1/2"	FLAT FACE	1/16"	1"	DEEP BLOCK	1/8"
5/8"	FLAT FACE	1/16"			
1/4"	ARROWS	.030" - .040"	1/2"	INDUSTRIAL	1/4"
1/2"	ARROWS	1/16"	3/4"	INDUSTRIAL	1/4"
5/8"	ARROWS	1/16"	1"	INDUSTRIAL	1/4"
1"	ARROWS	1/16"			
1 1/4"	ARROWS	3/32"			
1 1/2"	ARROWS	3/32"			

NOTE: Thicknesses listed are approximate, some variances occur due to the nature of casting



## NONDESTRUCTIVE TESTING EQUIPMENT

### Magnetic Source Tube Stands



Item	Description
2-Point Removable	2-Point Magnet Stand with Aluminum Base, two 100lb Magnets, Stainless Steel 3/4-16 Adapter, and 18" Long 3/4-16 Threaded Stainless Steel Tube
3-Point Removable	3-Point Magnet Stand with Aluminum Base, three 100lb Magnets, Stainless Steel 3/4-16 Adapter, and 18" Long 3/4-16 Threaded Stainless Steel Tube
4-Point Removable	4-Point Magnet Stand with Aluminum Base, four 100lb Magnets, Stainless Steel 3/4-16 Adapter, and 18" Long 3/4-16 Threaded Stainless Steel Tube
2-Point SS	2-Point Magnet Stand with Stainless Steel Base, two 100lb Magnets, and welded 18" long 1/2" dia Stainless Steel Tube or Rod (3/4" dia tube also available)
3-Point SS	3-Point Magnet Stand with Stainless Steel Base, three 100lb Magnets, and welded 18" long 1/2" dia Stainless Steel Tube or Rod (3/4" dia tube also available)
4-Point SS	4-Point Magnet Stand with Stainless Steel Base, four 100lb Magnets, and welded 18" long 1/2" dia Stainless Steel Tube or Rod (3/4" dia tube also available)
2-Point AL	2-Point Magnet Stand with Aluminum Base, two 100lb Magnets, and welded 18" long 1/2" dia Aluminum Rod (3/4" dia Rod also available)
3-Point AL	3-Point Magnet Stand with Aluminum Base, three 100lb Magnets, and welded 18" long 1/2" dia Aluminum Rod (3/4" dia Rod also available)
4-Point AL	4-Point Magnet Stand with Aluminum Base, four 100lb Magnets, and welded 18" long 1/2" dia Aluminum Rod (3/4" dia Rod also available)

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**

# SPEC Tungsten Collimators

Producing higher-resolution images while effectively reducing radiation levels on the job site.

## THE ADVANTAGES OF COLLIMATORS

Collimators are one of the most effective means available for reducing the radiation levels on a job site. Collimators also increase the quality of radiography shots by reducing the amount of scatter radiation that reaches the film. Collimators help reduce your restricted area and aid in obtaining As Low As Reasonably Achievable (ALARA) radiation levels. This translates into safer operating conditions for radiographers.

## WHY USE TUNGSTEN?

Because tungsten is a more effective shielding material than lead and is an easy-to-handle, non-licensed material, it makes a very effective shielding material. Another feature of the tungsten collimator is that it does not spark, so it is ideal for plant operations. In addition to the standard collimators listed at right, SPEC can build a collimator to your specifications.



*Panoramic degree collimators*



*Side port 90 degree collimators*

## SPEC SIDE PORT 90 DEGREE MINIMUM BEAM ANGLE COLLIMATORS

ITEM DESCRIPTION	ITEM #
<b>5 Half Value Layers "Mini" Collimator</b> Attaches to the end piece of the source tube and is able to fit into tight spaces. This is the most economical and versatile of all of our collimators. 1-1/2" Diameter x 1-7/8" Length; Weight: 1.75 lbs. Attenuation Factor Iridium-192 (3.125 X 10 <sup>-2</sup> ) 1/32	231001
<b>5 Half Value Layers Slotted Collimator</b> Attaches to the end piece of the source tube and is slotted to sit on the weld. The slot makes it easier to center the weld. 1-1/2" Diameter x 1 7/8" Length; Weight 1.75 lbs. Attenuation Factor Iridium-192 (3.125 X 10 <sup>-2</sup> ) 1/32	231005
<b>8 Half Value Layers Collimator</b> Attaches to the end piece of the source tube. This collimator offers a greater amount of shielding and is still able to fit into small spaces. Best used in situations where distance from the source is a factor. 2" Diameter x 2-5/16" Length; Weight 4.25 lbs. Attenuation Factor Iridium-192 (3.9 X 10 <sup>-3</sup> ) 1/256.	231002
<b>16 Half Value Layers Collimator</b> Attaches to the end of the source tube. The collimator offers even greater shielding, and it is much bulkier than the mini collimator. 3" Diameter x 3 2/5" Length; Weight 16.75 lbs. Attenuation Factor Iridium-192 (1.54 X 10 <sup>-5</sup> ) 1/65000.	231006

## SPEC PANORAMIC 360-DEGREE BEAM COLLIMATORS

ITEM DESCRIPTION	ITEM #
<b>4 Half Value Layers Collimator</b> Emits a 360 degree beam around the center and is shielded on the ends. The collimator is best used for taking shots of pipe welds, or tubulars from the inside. 1-1/2" Diameter x 3-1/2" Length; Weight 1.75 lbs. Attenuation Factor Iridium-192 (6.25 X 10 <sup>-2</sup> ) 1/16.	231003
<b>8 Half Value Layers Collimator</b> Emits a 360 degree beam around the center and offers a greater amount of shielding on the ends. The collimator is used for radiographing from the inside of pipe. 1-9/16" Diameter x 4-1/4" Length; Weight 2.5 lbs. Attenuation Factor Iridium-192 (3.9 X 10 <sup>-3</sup> ) 1/256.	231004
<b>13.5 Half Value Layers Collimator</b> Emits a 360 degree beam around the center and offers an even greater amount of shielding on the ends. The collimator is used to radiograph pipe from the inside. 2 1/4" Diameter x 8" Length; Weight 5.5 lbs. Attenuation Factor Iridium-192 (3.08 X 10 <sup>-5</sup> ) 1/32500.	231015

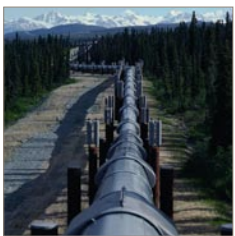
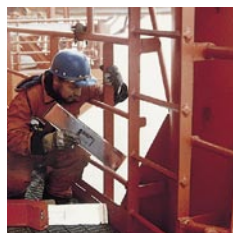
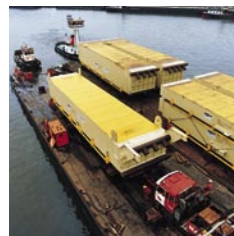



6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
 301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011  
 EMAIL: sales@detek.com



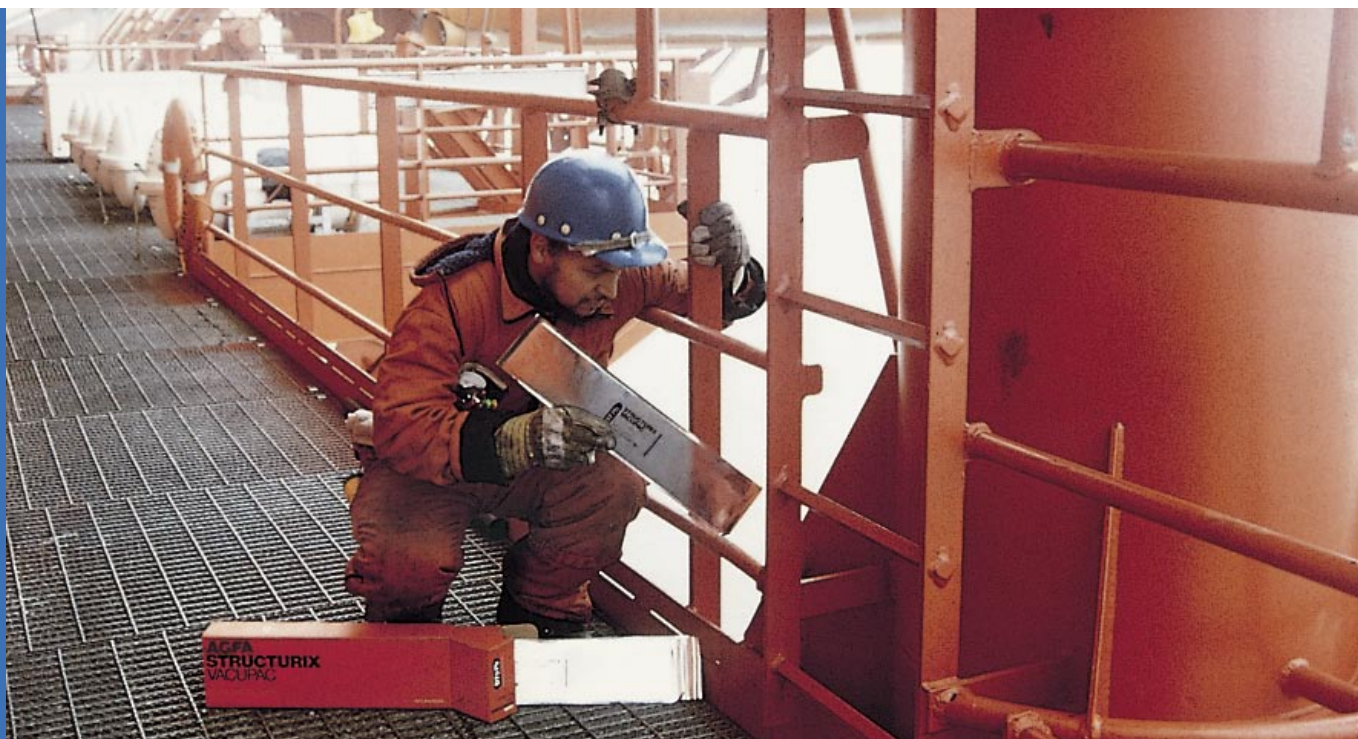


# Radiographic Film Systems



GE imagination at work 

## Helping you achieve your inspection and testing goals.



Whether you're an inspection services provider or the manufacturer of products that undergo non-destructive testing (NDT), GE Inspection Technologies can help improve the safety and profitability of your operation. We offer the world's most extensive array of NDT solutions. More importantly, we also put the world's most knowledgeable NDT experts at your service. Thanks to this combination of best-in-breed technologies and unsurpassed service, no challenge you might be facing is too difficult for GE Inspection Technologies.

### **Certified Quality**

We understand the responsibility you bear in quality assurance, and understand our role in your success. You can trust us to support you with radiographic film systems and services that consistently

give you the edge in quality control and customer satisfaction. Quality control is what helped AGFA become the first radiographic film manufacturer to achieve ISO certification for its STRUCTURIX films in 1990. Since then, we have continued this legacy of quality, assuring you that our entire film system—films, equipment, and chemistry—is produced under a strict Quality Management System approved to ISO 9001-2000. And all AGFA NDT film systems are certified according to the Industrial Film Systems Classification Standards to assure the delivery of consistent, expected capabilities in day-to-day use. So it should come as no surprise that GE Inspection Technologies is the only company able to offer you the AGFA NDT film systems, the only one that can boast certification by BAM, the independent German Federal Institute for Materials Research and Testing.

### **Integrated System**

All components of AGFA NDT film systems are designed and developed to work together seamlessly, start to finish. In bringing you integrated film systems, we're assuring you of improved quality, consistency, and safety, plus greater ease, savings in time and costs, and the peace of mind that comes with a proven, end-to-end solution. In bringing you renowned AGFA NDT film systems, we're providing you the films and solutions most widely used in industrial radiography. Compare GE Inspection Technologies to your other options and experience firsthand the difference in working with one proven source and one seamless solution for all of your inspection and testing.

# Film Systems

## AGFA NDT eco FILM SYSTEMS

The AGFA NDT eco Film System breaks new ground in being economical to use and ecologically responsible. This advanced film system increases economics and minimizes its impact on the environment with:

- up to 60% higher film throughput capacity
- up to 40% less chemistry and packaging
- up to 40% less chemistry and packaging waste
- considerable decrease in wash water replenishment rates
- lower silver freights in the wash water
- less energy consumption

You can trust GE Inspection Technologies as a company to do our part to preserve the global environment.

### A certified system

This AGFA NDT eco Film System is perfectly suited to applications that demand the highest image quality. The system is certified according to the Industrial Film Systems Classification Standards EN 584-1, ASTM E-1815-96, ISO 11699-1

and JIS-K7627. Recently, the German Federal Institute, BAM, awarded the AGFA NDT eco Film System in 5 minute cycle the certificate of compliance to International Classification Standards.

### AGFA NDT films

The AGFA NDT films D2, D3, D4, D5, D7, D8 can be used in this system. Adaptations have been made to harmonize the drying characteristics of this assortment.

### AGFA NDT Si and S eco in 5 minute cycle

The AGFA NDT Si and S eco are specially designed to meet the strictest standards for silver content in the wash water.

The secret lies in the processor's double fixing tank. This cascade fixing system ensures that the amount of silver in the wash water remains within the limit of < 50 mg/m<sup>2</sup>, which equals 4 ppm silver concentration. At a fixer replenishment rate of 1,200 ml/m<sup>2</sup>, a maximum silver concentration of 1 ppm is achieved.

### AGFA NDT chemicals

Thanks to the intelligent composition of the new chemicals AGFA NDT ecoDEV and ecoFIX, it is possible to reduce

chemistry consumption to less than 60 percent of present reference levels, while maintaining excellent sensitometric and physical characteristics. This drastic reduction in chemistry consumption translates into lower purchasing costs, while the smaller volume of developer and fixer waste leads to lower disposal costs.

## AGFA NDT STANDARD FILM SYSTEMS

For decades AGFA's standard film systems—both the G 128/G 328 chemicals for manual processing and the G 135/G 335 chemicals for automatic processing—rise up to the expectations of customers all over the world. No wonder GE Inspections Technologies' AGFA NDT radiographic film systems are most widely used. Their outstanding reputation is also thanks to continuous investments in R&D. With so many reasons why industrial customers choose AGFA NDT standard film systems, it should come as no surprise that they are certified according to the Industrial Film Systems Classification Standards.



AGFA NDT S eco



AGFA NDT eco Chemicals



AGFA NDT films D2 to D8

# Film Characteristics and Applications

## AGFA NDT D2

Extremely fine grain film with very high contrast. Ideal for exposures requiring the finest possible detail rendering.

- Electronic components
- Composite materials
- Castings (light metals and alloys)
- Multiple film techniques

## AGFA NDT D3

Ultra fine grain film with very high contrast. This film obtains a very high detail perceptibility, which meets the requirements of the most critical NDT applications. For direct exposure or with lead screens, using either X-ray, gamma rays, or radiation from megavolt equipment.

- Electronic components
- Composite materials
- Castings
- Very high quality welds
- Nuclear quality
- Aerospace and aircraft industry
- Multiple film techniques

## AGFA NDT D3 SC

Single coated film with very high image quality, accurate interpretability, high contrast. The colorless back coating guarantees a very flat film under all conditions.

- Electronic components
- Composite materials
- Neutron radiography
- Inspections whereby optical enlargement is required
- Multiple film techniques

## AGFA NDT D4 SC

Single-sided, high-contrast film with unmatched definition. The colorless anti-curl backing does not affect exposure or processing.

- Electronic components
- Composite materials
- Neutron radiography
- Inspections whereby optical enlargement is required
- Multiple film techniques

## AGFA NDT D4

Extra fine grain film with very high contrast. Suitable for a wide variety of critical applications. For direct exposure or with lead screens, using either X-ray, gamma rays, or radiation from megavolt equipment.

- Electronic components
- Composite materials
- Castings
- Very high quality welds
- Defense and nuclear industry
- Aerospace and aircraft industry
- Multiple film techniques

## AGFA NDT D5

Very fine grain film with high contrast. Excellent for visualization of discontinuities. This film is intended for direct exposure or use with lead screens, using either X-ray or gamma rays.

- Welding
- Castings
- Shipbuilding
- Aerospace and aircraft industry
- Multiple film techniques

## AGFA NDT D7

Fine grain film with high contrast and high speed. Designed for direct exposure or with lead screens. For exposure with lead screens, using either X-ray or gamma rays.

- Welding and casting
- Defense industry
- Aerospace and aircraft industry
- Composite materials
- Multiple film techniques

## AGFA NDT D8

Medium grain film with high contrast and very high speed. Suitable for a variety of applications. This film can be used for direct exposure or with lead screens. It gives good image quality with short exposure times. If even higher speed is required, fluorescent screens, in combination with AGFA NDT F8 (not D8), should be used.

- Concrete and heavy construction work
- Castings
- Multiple film techniques



### AGFA NDT Wide Latitude films

The AGFA NDT wide latitude films are specially designed for in-process radiography and to inspect wide range thickness objects such as castings.

#### AGFA NDT D4W

An extra fine grain film with medium contrast and very high speed. The film can be used for direct exposure techniques or with lead screens.

- Ferrous and non-ferrous castings
- Multi-thickness objects
- Non-critical welds

#### AGFA NDT D6W

A high contrast, fine grain film with medium contrast combining good image quality and wide latitude.

## SPECIAL APPLICATION FILMS

#### AGFA NDT F8

Designed as a high-quality film for fluorometallic (RCF) screen exposure when the speed obtainable with Pb screen system is insufficient or radiation safety is of prime importance.

- On stream corrosion/erosion radiography
- Concrete and heavy construction work
- Low dosage output, e.g. microfocus

#### AGFA NDT F6

Medium speed, high contrast, fine grain film. Specially designed for short exposures through the use of fluorometallic screens and fast processing cycles

- Offshore pipelines or similar applications

## INTENSIFYING SCREENS

#### AGFA NDT RCF

Blue emitting fluorometallic screen used in combination with Agfa NDT F6 or F8. Reduces radiation exposure and/or the level of necessary radiation.

- Radiography of thick objects
- Inspection of offshore pipelines
- On-stream

#### AGFA NDT 1200

Blue emitting fluorescent screen with extremely high absorption and conversion efficiency, together with acceptable detail perceptibility.

- High-energy applications, including such large concrete structures as bridges and buildings
- Flash radiography in which exposure times are extremely short
- Microfocus-enlargement techniques in which radiation doses are very low



# Image Quality and Film System Classifications

## A NEW FILM SYSTEM CLASSIFICATION

The introduction of the Industrial Film Systems Classification Standards EN 584-1, ASTM E-1815-96, ISO 11699-1, and JIS-K7627 provides an important means to assign film systems to the appropriate film system class.

These standards identify the various types of industrial X-ray film systems and classify them based on objectively quantified parameters that are the foundation of film imaging performance.

In the context of growing quality awareness, the new perception of film system classification, described in EN 584-1, ASTM E-1815-96, ISO 11699-1, and JIS-K7627, is gradually becoming the norm for the industry.

The standards for control of film processing EN 584-2 and ISO 11699-2 provide the means to control the processing at the processor user level. The objective is to make sure that a classified system will produce the expected results in daily use.

Film Type AGFA NDT	CEN EN 584-1	ASTM E 1815-96	ISO 11699-1	JIS-K7627
D2	C1	special	T1	T1
D3 s.c.			T1	T1
D4 s.c.			T1	T1
D3	C2	I	T1	T1
D4	C3	I	T2	T2
D5	C4	I	T2	T2
D7	C5	II	T3	T3
D8	C6	III	T4	T4

## QUALITY ASSURANCE TOOLS

GE Inspection Technologies provides you with AGFA NDT Quality Assurance Tools, a set of practical, dedicated tools for the radiographer to control and prove compliance of his or her entire system.



### AGFA NDT CERTIFIED PMC STRIP

The AGFA NDT Certified Processing Monitoring Control Strip is a handy, fast, and reliable tool for monitoring the quality of the film processing system and for proving compliance with existing standards on systems classifications. AGFA NDT PMC Strips are also available without certificate.



### AGFA NDT CERTIFIED DENSTEP

The AGFA NDT Certified DENSTEP is a density step wedge film to verify the calibration of optical transmission densitometers used in the industrial X-ray field.



### AGFA NDT THIO-TEST

The AGFA NDT THIO-TEST measures the archivability of processed film by measuring the residual thiosulphate in the emulsion layers.

# The Right Packaging



GE offers different forms of film packaging, all in accordance with the ISO 5655 norm. Whatever the application of industrial radiography, there is a right AGFA NDT film available, in the right packaging. No object is too large nor too small. AGFA NDT films are supplied in all standard sheet and roll sizes (special sizes on demand) and in darkroom or daylight packaging.

## SHEET FILM IN DAYLIGHT PACKAGING

### Pb VACUPAC

- the perfect daylight packaging
- film is sandwiched between two 0.027 mm lead screens vacuum packed guaranteeing optimal image quality
- completely light tight, airtight, and moisture proof
- can be used under extremely dirty and damp conditions
- ideal for applications with energies higher than 100 kV

### Pb ETE (EDGE-TO-EDGE)

- film is sandwiched between two 0.027 mm lead screens
- double-sided edge makes it possible to place the film against or between elements of a work piece easily and accurately
- opening is as simple as tearing the thread included for this purpose
- envelopes can be cut easily and taped for use with odd-shaped angles and corners
- envelopes are easy tape to the work piece
- designed for exposures with energies higher than 100 kV and isotopes

### DW ETE (EDGE-TO-EDGE)

- identical to Pb ETE, but specifically intended for material testing using low to very low radiation energy (<100 kV)
- packaged without lead screens

## ROLLS IN DAYLIGHT PACKAGING

### Pb ROLLPAC

- light tight, moisture proof, and greaseproof
- film is sandwiched between two 0.027 mm lead screens
- specially designed to apply to spherical or tubular objects

### DW ROLLPAC

- identical to Pb ROLLPAC, but specifically intended for material testing using low to very low radiation energy (<100 kV)
- packaged without lead screens

## ROLLPAC PRECUT

- films in ROLLPAC packaging can be supplied in precut lengths from 70 cm by special order
- ideal for pipeline projects, which generally consist of large series of pipes of the same diameter
- highly economical



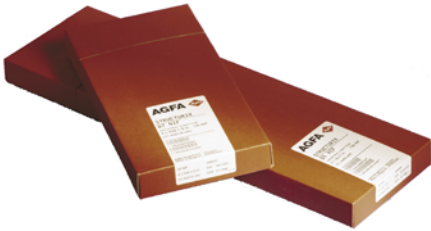
*Extra vacuum protection  
Each pack of 100 sheets is supplied "in vacuo"  
to preserve the vacuum well beyond the  
expiration date.*

# The Right Packaging

## SHEET FILM IN DARKROOM PACKAGING

### NIF (NON-INTERLEAVED FILMS)

- the most economical way to buy sheet film
- the intrinsic film quality is the same as that of pre-packed film
- sheets of film are packed per 100 in a paalpo bag inside a cardboard box
- the paalpo bags allow for easy film removal and re-closure



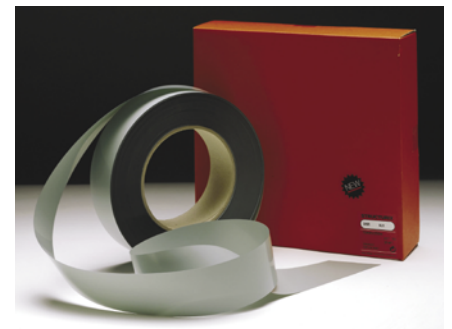
### FW (FOLDER WRAPPED)

- each film is wrapped in a paper folder to prevent handling faults in the darkroom
- paper folders make it easy to store and protect the films after processing
- folder-wrapped packaging is ideal when open boxes remain in use for a period of time in areas of high humidity and temperature, as the folder prevents the films from sticking together

## ROLLS IN DARKROOM PACKAGING

### BLR (BULK LOAD ROLL)

- packaging with bare film on a cardboard core
- film can be cut to any length and loaded with or without lead screens in reloadable cassettes in the darkroom





AGFA NDT chemicals are designed to obtain the best processing quality with AGFA NDT X-ray films. Because the goal in film processing is to control all of the parameters that influence the image quality of the radiographs, the use of optimal chemicals is essential. GE Inspection Technologies provides a complete line of advanced, high-quality AGFA NDT processing chemicals specially designed for industrial X-ray applications. AGFA NDT chemicals are also designed developed and manufactured to have a minimal impact on the environment.

## MANUAL PROCESSING CHEMICALS

### AGFA NDT G 128 DEVELOPER

G 128 is a single part, liquid developer for manual processing of industrial X-ray films. Its main advantages include:

- robust performance even at high ambient temperature and high humidity
- excellent stability during storage as concentrate

### AGFA NDT G 328 FIXER

G 328 fixer is a single part, liquid fixer for manual processing of industrial X-ray films.

- contains no hardening agent

## AUTOMATIC PROCESSING ecoCHEMICALS

### AGFA NDT ecoDEV

The AGFA NDT ecoDEV is a new two-part developer suitable for universal use but specifically designed for super fast 5 minute processing with lower replenishment rates while delivering optimal developing capabilities. The hardener-free and boron-free AGFA NDT ecoDEV has a reduced impact on the environment.

### AGFA NDT ecoSTART

AGFA NDT ecoSTART is a new one-part starter solution to be added to ecoDEV ready-for-use solution when the developer is replaced, ensuring optimal radiographs right from the start.

### AGFA NDT ecoFIX

The AGFA NDT ecoFIX is a new two-part boron-free fixer for universal use but specially designed for super fast processing, with lower replenishment rates while rendering improved archiving results.

## AUTOMATIC PROCESSING STANDARD CHEMICALS

### AGFA NDT G 135 DEVELOPER

AGFA NDT G 135 is a three-part developer that can be used for both automatic and manual processing. The developer is known for its durability, stability, and intrinsic quality, guaranteeing outstanding sensitometric and physical characteristics. Furthermore, the developer has self-cleaning characteristics.

### AGFA NDT G 135 s STARTER

AGFA NDT G135 s Starter is a one-part, ready-for-use starter solution recommended whenever the G135 developer is replaced, ensuring optimal radiographic images right from the start.

### AGFA NDT G 335 FIXER

The AGFA NDT G 335 Fixer is a two-part fixer for universal use in either automatic or manual processing, with excellent archival permanence. The formula prevents crystallization, reduces maintenance requirements, and is most suitable for silver recovery.

## CLEANING PRODUCTS

### AGFA NDT DEVCLEAN

DEVCLEAN is a highly efficient, two-part maintenance product for the thorough cleaning of the developing area of both manual and automatic processor tanks along with the accessories used for manual development. Silver deposits and sludge on all parts dissolve effortlessly, completely, and rapidly.

### AGFA NDT FIXCLEAN

FIXCLEAN is a one-part, liquid cleaning product for regular maintenance of the fixer and wash water areas of manual and automatic processor tanks as well as chemistry mixers.



# Processing Equipment

GE Inspection Technologies provides the full AGFA NDT Film Systems product line, consisting of an innovative assortment of films, chemicals, and processors perfectly geared to one another. AGFA NDT processors are among the most popular in the non-destructive testing industry. The satisfaction of our customers is the best example of the reliability, performance, and cost saving features of the AGFA NDT equipment.

## AUTOMATIC FILM PROCESSING EQUIPMENT

### REVOLUTIONARY “eco” or CASCADE FIXING PROCESSING TECHNOLOGY

The AGFA NDT Si, S eco and M eco are the next generation of industrial film processors specially designed to meet the strictest standards for silver content in the wash water. The secret lies in the double fixing tank. This cascade fixing system ensures that the amount of silver in the wash water remains significantly lower than in conventional processing systems. Such money-saving innovations as film area detection and infrared drying result in lower chemistry, water, and electricity consumption.

### AGFA NDT Si and S eco

AGFA NDT Si and S eco form the basis of the AGFA NDT high-capacity film system that boasts a revolutionary design and takes X-ray film processing to the next level. Both processors are leading-edge processors bringing higher film throughput capacity, precise replenishment rates, superior image quality, optimized archiving results, easier maintenance, and minimum processing costs.



### AGFA NDT M eco

The compact AGFA NDT M eco is a smaller version of the Si and S eco.

- specially designed for consumers of small and medium-sized quantities of films
- economical consumption of chemistry, water, and electricity
- infrared drying reduces heat produced in the darkroom
- the optimal replenishment system as a result of film surface scanning
- an intermediate washing system that keeps the fixer bath in optimum condition
- washing system also prevents development faults occurring on the film





### AGFA NDT U

With the AGFA NDT U, you have at your disposal the most universal processor from our selection. AGFA NDT U combines simplicity, reliability, and universal use in one processor. It is specially designed for customers who use medium-sized quantities of film. The AGFA NDT U is very versatile and processes sheet film as well as roll film.

- perfect processing quality
- selectable processing cycles
- replenishment by area



### AGFA NDT FEEDER

Compact and time-saving, the AGFA NDT FEEDER converts the AGFA NDT Si, AGFA NDT S eco, and AGFA NDT U into practical daylight systems. With the AGFA NDT FEEDER, you can save time and expense in the darkroom. Multiple film sizes can be accommodated.

### AGFA NDT MIXER

The AGFA NDT MIXER is a fully independent unit that relieves you of mixing chemicals. Simply place the bottles at the right time on top of the NDT MIXER. The rest occurs automatically to save time and prevent errors.

- ensures optimal mixing of developer and fixer
- yields consistent, high-quality film results



## MANUAL FILM PROCESSING EQUIPMENT

### AGFA NDT DRYER

Inexpensive to purchase and operate, the AGFA NDT DRYER is essential equipment for labs that do not use automatic processors but process X-ray films manually.

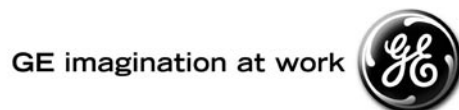


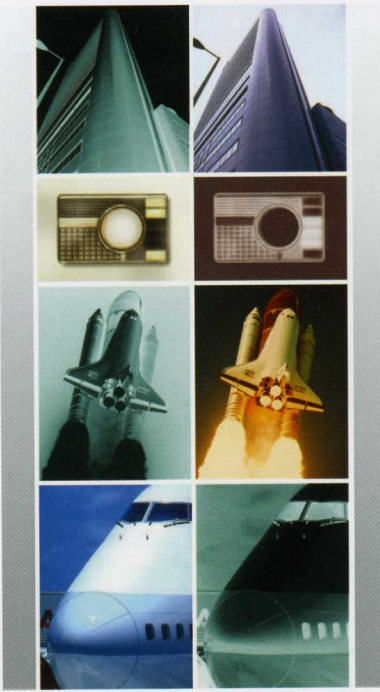
## What can GE do for you?

As the world's leading supplier of industrial radiographic solutions, AGFA's quality and reliability are well known. GE Inspection technologies is proud to be the exclusive provider of AGFA's renowned NDT solutions.

These wide-ranging and comprehensive solutions likely include a solution to the challenges you are facing. If not, the application experts at GE Inspection Technologies can help custom design a non-destructive testing system for you. Our experts are conveniently located in application centers around the world, staffed by people who understand your industry and your needs. They alone can draw on the broadest range of NDT technologies and the global experience of GE.

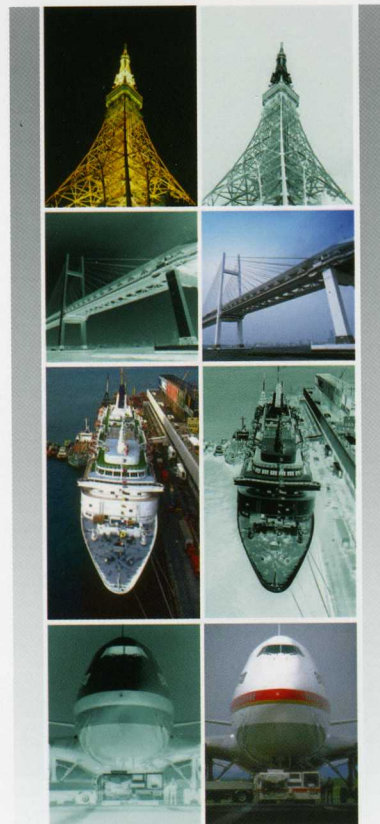
To find out what we can do for you, contact your nearest GE Inspection Technologies sales representative or visit [www.GEInspectionTechnologies.com](http://www.GEInspectionTechnologies.com) today.





## Industrial X-RAY FILM

# IX





# FUJI INDUSTRIAL RADIOGRAPHIC FILMS

for consistent high quality  
non-destructive inspection

Fuji industrial radiographic films feature revolutionary new film technology. The combination of the latest in emulsion making science and computerized manufacturing processes assure consistent batch to batch performance, optimum image quality and compatibility with all NDT chemistries and current brand tank/automatic processing conditions. The Fuji family of films incorporate unique speed, and grain technologies thus permitting their use over a wide range of applications with consistent high quality regardless of the material examined and the source of radiation employed.

Film	Applications	Features
Type/ID Notch		
IX 20	<ul style="list-style-type: none"> <li>• Micro-electronic parts</li> <li>• Neutron radiography</li> <li>• Critical investment castings</li> <li>• Ultra-fine ceramic parts</li> <li>• Graphite composite parts</li> </ul>	<p>A single emulsion, ultra-fine grain, medium high contrast film suitable for critical imaging quality applications.</p> <p>Its single emulsion feature minimizes parallax and permits extremely sharp magnified viewing.</p> <p>IX20 is generally used in direct exposure techniques or with lead screens.</p>
IX 25	<ul style="list-style-type: none"> <li>• Micro-electronic parts</li> <li>• Fine ceramic parts</li> <li>• Castings: low to medium atomic number metals</li> <li>• Applications requiring the highest of contrast</li> <li>• High-output supervoltage X-ray exposure</li> </ul>	<p>Fuji's finest grain, high contrast ASTM special film having maximum sharpness and discrimination characteristics. It is suitable for new materials, such as carbon fiber reinforced plastics, ceramic products, and micro electronic parts.</p> <p>IX25 is generally used in direct exposure techniques or with lead screens.</p> <p>IX25 is recommended for automated processing only.</p>
IX 50	<ul style="list-style-type: none"> <li>• Electronic parts</li> <li>• Graphite epoxy composites</li> <li>• High curie isotope exposures</li> <li>• Castings: low to medium atomic number metals</li> </ul>	<p>An ultra-fine grain, high contrast ASTM Class I film having excellent sharpness and high discrimination characteristics. It is suitable for use with any low atomic number material where fine image detail is imperative. Its ultra-fine grain makes it useful in high energy, low subject contrast applications where high curie isotopes or high output X-ray machines permit its use. Wide exposure latitude has been demonstrated in high subject contrast applications. IX50 is generally used in direct exposure techniques or with lead screens.</p>
IX 80	<ul style="list-style-type: none"> <li>• Welds: low to medium atomic number metals</li> <li>• Castings: low to medium atomic number metals</li> <li>• Aircraft construction and maintenance</li> <li>• Graphite epoxy composites</li> </ul>	<p>An extremely fine grain, high contrast ASTM Class I film suitable for detection of minute defects. It is applicable to the inspection of low atomic number materials with low kilovoltage X-ray sources as well as inspection of higher atomic number materials with high kilovoltage X-ray or gamma ray sources. Wide exposure latitude has been demonstrated in high subject contrast applications. IX80 is generally used in direct exposure techniques or with lead screens.</p>
IX 100	<ul style="list-style-type: none"> <li>• Welds: medium to higher atomic number metals</li> <li>• Castings: medium to higher atomic number metals</li> <li>• Aircraft construction and maintenance</li> <li>• Ordnance inspection</li> </ul>	<p>A very fine grain, high contrast ASTM Class II film suitable for the inspection of light metals with low activity radiation sources and for inspection of thick, higher density specimens with high kilovoltage X-ray or gamma ray sources. Wide exposure latitude has been demonstrated in high contrast subject applications. Although IX100 is generally used in direct exposure techniques or with lead screens, it is suitable for use with fluorescent or fluorometallic screens.</p>
IX 150	<ul style="list-style-type: none"> <li>• Heavy, multi-thick steel parts</li> <li>• Steel reinforced concrete</li> <li>• Low curie isotope and low-output X-ray exposures</li> </ul>	<p>A high speed, fine grain, high contrast ASTM Class III film suitable for inspection of a large variety of specimens with low-to-high kilovoltage X-ray and gamma ray sources. It is particularly useful when gamma ray sources of high activity are unavailable or when very thick specimens are to be inspected. It is also useful in X-ray diffraction work. IX150 is used in direct exposure techniques or with lead screens.</p>
IX 29	<ul style="list-style-type: none"> <li>• Castings and other multi-thickness subjects</li> </ul>	<p>An ultra-fine grain, medium-high contrast ASTM Class W-A film suitable to inspect wide range thickness subjects such as precision cast parts with X-ray or gamma ray sources. IX29 can be used in direct exposure techniques or with lead screens.</p>
	<ul style="list-style-type: none"> <li>• Castings and other multi-thickness subjects</li> </ul>	<p>An extremely fine grain, medium contrast ASTM Class W-B film suitable to inspect multi-thick, low atomic number metal, and steel cast parts. IX59 can be used in direct exposure</p>



# Advantages of FUJI IX Film

## (1) High Image Quality

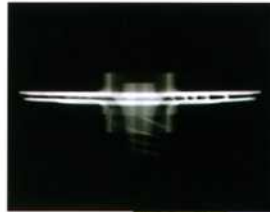
Fuji IX films exhibit high defect recognition due to their fine granularity.

## (2) Constant Performance

For example, Fuji batch to batch consistency is the best in the industry.  
For this reason, exposure conditions don't vary from one part to the next, thereby increasing productivity.

## (3) Less density uneveness.

Fuji emulsion coating is so even and uniform that it avoids most of the density uneveness that sometimes occurs in automatic processing with other products.



Film	Relative speed*				Film system class			Sheet : Non interleaved
	100KV Direct	200KV with lead	Ir-192 with lead	Co-60 with lead	ASTM E1815-96	ISO 11699-1	JIS K7627	Available packaging type
IX 20	10	9	8	5	—	—	—	Sheet : Non interleaved
IX 25	20	17	15	10	SPECIAL	T1	T1	Sheet : Non interleaved : Envelopak : Envelopak+Pb Roll : Non interleaved : Envelopak, Envelopak+Pb
IX 50	35	30	30	30	I	T2	T2	Sheet : Interleaved : Non interleaved : Envelopak, Envelopak+Pb Roll : Non interleaved : Envelopak, Envelopak+Pb
IX 80	55	55	55	55	I	T2	T2	Sheet : Interleaved : Non interleaved : Envelopak, Envelopak+Pb Roll : Non interleaved : Envelopak, Envelopak+Pb
IX 100	100	100	100	100	II	T3	T3	Sheet : Interleaved : Non interleaved : Envelopak, Envelopak+Pb Roll : Non interleaved : Envelopak, Envelopak+Pb
IX 150	200	200	170	170	III	T4	T4	Sheet : Interleaved : Non interleaved : Envelopak, Envelopak+Pb Roll : Envelopak, Envelopak+Pb
IX 29	22	22	22	22	W-A	—	W-A	Sheet : Non interleaved : Envelopak Roll : Non interleaved : Envelopak
IX 59	45	45	45	45	W-B	—	W-B	Sheet : Non interleaved : Envelopak Roll : Non interleaved : Envelopak



# *Fuji 5-minute processable IX films are offered in eight types with a variety of packaging to meet any NDT need.*

## Sheet and Sheet-Pack Film



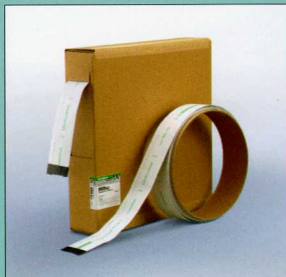
Four types of sheet film package including interleaved, Non-interleaved, Envelopak, and Envelopak + Pb are available in most conventional sizes. Blue tint and sharper images make these products ideal for the most critical radiographic applications.



### Envelopak Sheet Film

Envelopak is a complete daylight package containing pre-cut sheet film. Triple-layered packaging is water-proof and oil resistant, permitting ease of use under most exposure/environmental conditions. Envelopak is available with or without lead screens.

## Roll and Roll-Pack Film



Roll film is pre-cut in 70mm, 10", 14" and 17" standard widths. Blue tint and sharper images make these films ideal for the most critical radiographic applications. Supplied in a convenient dispenser box, Roll-Pack is available with or without lead screens (Envelopak Roll and Envelopak + Pb Roll). The sealed and flushed edge is cut at any desired length for subjects requiring special film sizes. Darkroom loading Roll Film is also available.



FUJIFILM NDT Systems  
1055 Stevenson Court  
Roselle, IL 60172-2300  
630-582-2202  
800-323-2546  
[www.fujindt.com](http://www.fujindt.com)

# **Fuji Chemicals**

## **AUDEL**

A superior high contrast developer designed specifically for industrial automatic processing. This developer is becoming "World Famous" for running clean and keeping processors clean. Capable of processing large quantities of industrial X-ray film. Pratt & Whitney approved.

## **UNIVERSAL FIXER**

Designed specifically for Automatic and Manual fixing of Industrial X-ray film. This two part liquid concentrate is formulated for optimum results.

## **HI RENDOL "I"**

A single Manual Developer formulated for today's high demand manual processing. Capable of processing large quantities of industrial X-ray film.

## **MANFLO**

For the polished surface appearance, this wetting agent is used in manual processing to prevent water spotting and the uneven drying of industrial X-ray films.

## **DEVELOPER STARTER**

Designed specifically for use with Audel developer. Each 1/2 gallon bottle contains enough starter to season 24 gallons of developer solution.

## **DEVELOPER SYSTEMS CLEANER**

An environmentally friendly liquid systems cleaner designed to clean the developer tank and developer recirculation system of automatic processors as well as associated racks, rollers, etc. Also suitable for cleaning developer hand tanks.

## **FIXER SYSTEMS CLEANER**

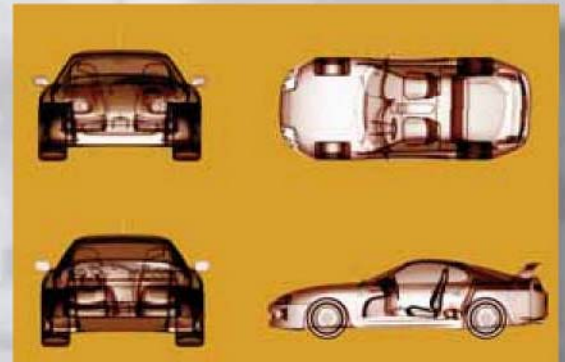
An environmentally friendly liquid systems cleaner formulated to clean the fixer tank and fixer recirculation system of automatic processors as well as associated racks, rollers, etc. Also suitable for cleaning fixer hand tanks.



**DETEK, Inc.**  
6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
**800-638-0554**    **FAX 301-449-7011**  
www.detek.com    sales@detek.com



# CPAC Industrial NDT



**Chemistry, Equipment & Mixers**

**cpac**  
Imaging

## Processing Chemicals

### CPAC Industrial Automatic Developer



A three part liquid formulation. Can be mixed manually or used in conjunction with an automatic mixer.

Makes 10 gallons (38 liters) #24115

2 x 5 gallon kits

Makes 200 gallons (760 liters) #24015

- 1 Unit Part A (50 gallon drum of concentrate)
- 1 Unit Part B (2.5 gallon container of concentrate)
- 1 Unit Part C (3.5 gallon container of concentrate)
- Two units of Part C required to make 200 gallons

### CPAC Industrial Manual Developer



2 x 5 gallon kits #24118

### CPAC Industrial Fixer (For Automatic and Manual Processes)

A two part liquid formulation. Can be mixed manually or used in conjunction with an automatic mixer.

Makes 10 gallons (38 liters) #24117

2 x 5 gallon kits

Makes 200 gallons (760 liters) #24017

- 1 Unit Part A (50 gallon drum of concentrate)
- 1 Unit Part B (5 gallon container of concentrate)
- Two units of Part B required to make 200 gallons

### CPAC Industrial Developer Starter



Used when preparing the initial CPAC Industrial Developer solution.

6 -- 1 qt. bottles #29027

#### Chemistry Conversion Table

Agfa NDT G135 Developer 2 x 5  
 Agfa NDT G135 Developer 50 gal. Drum  
 Fuji Audel Developer  
 Kodak Industrex Developer  
 Agfa NDT G335 Fixer 2 x 5  
 Agfa NDT G335 Fixer 50 gal. Drum  
 Fuji Universal Fixer  
 Kodak Industrex Fixer  
 Agfa NDT G1 35s Starter  
 Fuji Starter  
 Kodak Industrex Starter

#### Converts to

CPAC NDT Developer 2 x 5  
 CPAC NDT Developer Drum Kit  
 CPAC NDT Developer  
 CPAC NDT Developer  
 CPAC NDT Fixer  
 CPAC NDT Fixer Drum Kit  
 CPAC NDT Fixer  
 CPAC NDT Fixer  
 CPAC NDT Fixer  
 CPAC NDT Starter  
 CPAC NDT Starter  
 CPAC NDT Starter

#### Catalog

#24115  
 #24015  
 #24115  
 #24115  
 #24117  
 #24017  
 #24117  
 #24117  
 #24117  
 #29027  
 #29027  
 #29027



## Cleaning Products



### Developer Systems Cleaner Kit

This rapid acting processor cleaner removes chemistry residue, silver deposits and algae from developer tanks, wash tanks and racks of all processors. This kit contains NO chromium compounds.

Makes 2 gallons - 2 mixes/package #28560

2-32 oz. Pt A's; 2-32 oz. Pt B's;  
2-32 oz. Neutralizer's

### Fixer Systems Cleaner

Highly effective, makes tanks and racks look new with less time and work. The cleaners are environmentally safe when used as directed.

Makes 2 gallons #29025

4 x 1/2 gallon

### BioEase Wash Water Tablets

This easy-to-use tablet eliminates and prevents most algae and slime in all wash systems of processors. One tablet treats 20 gallons of wash water.

25 tablet bottle #774165

500 tablet bag #774165-500

### BioPERGE® Liquid Biocide

BioPERGE® is formulated for the control of bacteria and fungi. This product is EPA registered for water recycling. BioPERGE has the following benefits: biodegradable, convenient liquid, broad spectrum microbiological activity, reduces costly down time, keeps systems cleaner longer and helps control odors associated with deposits of sludges.

5 gallon cube #900145-005

30 gallon cube #900145-030

### Photo-Ease Industrial Cleaner

Industrial-strength, biodegradable cleaner removes stubborn processing chemical stains from many surfaces. This non-flammable, rust inhibiting, non-corrosive cleaner works wonders on processor and mixer tanks. Photo-Ease is simple to use, and also removes stubborn stains like grease, tar, oil, and rust from metal surfaces.

22 oz. spray trigger bottle #775253

1 gallon #774257

### pHotoDerm Hand Soap

A pH balanced liquid-gel designed for people who work with processing chemicals. pHotoDerm penetrates the skin to neutralize odors, remove chemical residue, and prevent skin irritation. This fast acting formula is gentle enough to moisturize your hands, and strong enough to prevent dermatitis and other allergic skin reactions.

11 oz. bottle #774255



# Equipment & Mixers

## CPAC Silver Recovery Electrolytic Systems

### ML-27



Application: Recommended for medium sized industrial x-ray labs for treatment of all combinations of fixer solutions. Equipped with a stationary cathode, meaning less moving parts, that equates to minimal maintenance. It can be plumbed directly to processor fix overflow or can easily be filled manually via an integral funnel assembly in rear of tank. Desilters a 4 1/2 gallon batch. Holding tank capacity is 10 1/2 gallons.

Expected results: ML-27 units reduce silver content to approximately 100 ppm (mg/l). Tailed with a Trickle Tank and RePAC -10 iron mesh cartridge, each unit can reduce silver content to less than 5.0 ppm (typically 2.0 ppm or less).

### ARU-2100, 700 & RU-4



Application: Recommended for small industrial x-ray labs for treatment of all combinations of fixer solutions. It must be plumbed directly to the processor fix overflow. These units are referred to as "terminal" type silver recovery units. They range in recover capacity from .5 troy oz./hr to 3 troy oz./hr. Typical application ranges from 1.5 gallons to 8 gallons per 8 hours. Recommend using a RePAC-10 iron mesh tailing cartridge after the silver recovery unit to collect any residual silver.



### SilvPAC LM/BF 15 & 20



Application: Recommended for large industrial x-ray labs for treatment of all combinations of fixer solutions. Equipped with a stationary cathode, meaning less moving parts, that equates to minimal maintenance. The two piece cathode design allows for quick silver harvesting. There is no need to scrape the cathode, just flex it and the silver falls off. Able to desilver up to 75-120 gallons per day, respectively.

## CPAC Chemical Mixers

### AutoMixer



CPAC AutoMixer mixes packaged (bi-pak) developer and fixer concentrate with water in a clean and consistent method to meet specific gravity specifications. Versatile 7.5 or 12.5 gallon capacity allows larger volumes of working solution when needed.

### RAM-C-NDT



If using more than ten gallons of fixer or developer a day, the RAM-C will minimize your chemical mixing and handling responsibilities. Great for Industrial X-Ray labs running multiple shifts. The RAM-C combines a high-volume chemical mixer with replenishment holding tanks. Plus, you can feed up to six processors from one unit. Precisely mixes chemistry to any manufacturers specific gravity specifications. Replenishment tanks are equipped with separate agitation pumps to ensure the chemicals are mixed properly and to prevent oxidation. For use with developer and fixer concentrates, from 15 to 55 gallon drums.



Chemistry:  
5440 Oakbrook Parkway, Norcross, Georgia 30093 Ph.: 800-262-9333  
Equipment:  
2364 Leicester Road • P.O. Box 175, Leicester, NY 14481 Ph.: 800-828-6011  
[www.cpacequipment.com](http://www.cpacequipment.com)

# Kodak Industrex AA400

## Film

### VERSATILITY IS THE KEY.



KODAK INDUSTREX AA400 Film is extremely versatile, which makes it a great solution for many industrial applications. You can use it in multiple-film radiography and in single-film techniques—and with direct x-rays or with lead foil screens. Best of all, AA400 Film incorporates Carestream Health's patented T-GRAIN Emulsion technology.

#### The Basics

AA400 Film is an ASTM E 1815-96 Class II film that offers high speed, high contrast and gives you a fine-grain image. This film offers incredibly robust handling characteristics. It can withstand high temperatures and humidity, and it is resistant to static artifacts—so you get the image you need, whatever the conditions you're working under.

#### Recommended Uses

KODAK INDUSTREX AA400 Film is available in a wide range of sizes and packaging formats, and it's designed for applications such as:

- Aircraft inspection
- Aero-engines
- Archeological artifacts
- Assemblies
- Castings
- Concrete
- Electrical components
- Forensics
- Forestry
- Munitions, bomb disposal
- Nuclear applications
- Pipelines
- Tires
- Welded fabrication

#### Get the T-Grain Emulsion Advantages

KODAK INDUSTREX Films with T-GRAIN Emulsion offer a brand new, state-of-the-art technology that's specifically designed for industrial radiographic testing applications. What does that mean for you?

#### Outstanding Image Quality

With a cool, clean image tone and low noise, you get a sharp, clear image every time.

#### Convenient Processing Flexibility

The films work well in standard process cycles—but they're just as effective in longer or shorter process cycles.

#### Superb Durability

The films are static resistant, more heat resistant than conventional systems, incredibly sturdy, and you'll get fewer artifacts from handling.

# KODAK INDUSTREX AA400 Film

## Processing Options

AA400 Film can be processed manually or automatically in a range of processing cycles.

Notice: Observe precautionary information on product labels and Material Safety Data Sheets. Develop with rack and tank, using properly replenished solutions.

## Automatic Processing

See Carestream Health publication TI-2621, *Processing KODAK INDUSTREX Films*, for additional information on automatic processing.

## Film Characteristics (Sensitometric)

ISO/EN exposure conditions: 200/220 kV, lead screens; KODAK INDUSTREX Single Part Developer Replenisher and KODAK INDUSTREX LO Fixer and Replenisher.

KODAK INDUSTREX Processors/Cycles	Base + Fog	Contrast <sup>1</sup>
M431C—8 min 79°F (26°C)	0.20	4.7
M431C—5 min 86°F (30°C)	0.20	4.65

<sup>1</sup>Contrast calculated between net densities of 1.5 and 3.5.

## Manual Processing

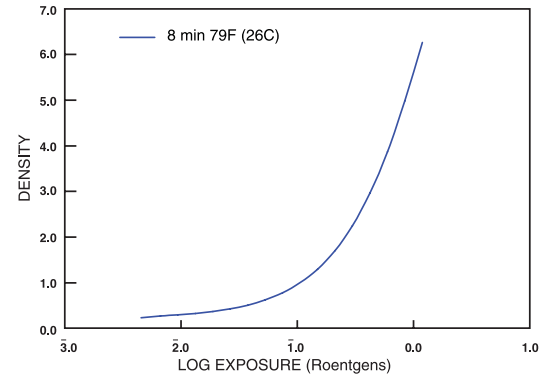
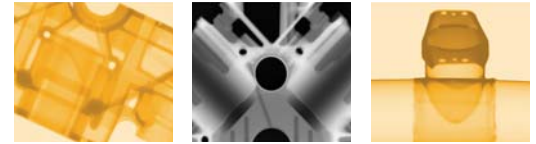
See Carestream Health publication TI-2643, *Guide to Manual Processing of KODAK INDUSTREX Films*, for additional information on manual processing.

Develop with rack and tank, using properly replenished solutions.

Developer	Temperature	Recommended Time (Minutes)	Agitation
KODAK INDUSTREX Single Part Developer	68°F (20°C)	5	Intermittent
Replenisher	72°F (22°C)	4	(5 seconds, every 30 seconds)
	75°F (24°C)	3	
	79°F (26°C)	2	

## For More Information

To learn more about KODAK INDUSTREX AA400 Film and other Carestream Health NDT products and solutions, contact a Carestream Health representative at 877-865-6325 ext 714 or visit [www.carestreamhealth.com/go/ndt](http://www.carestreamhealth.com/go/ndt).



### Exposure:

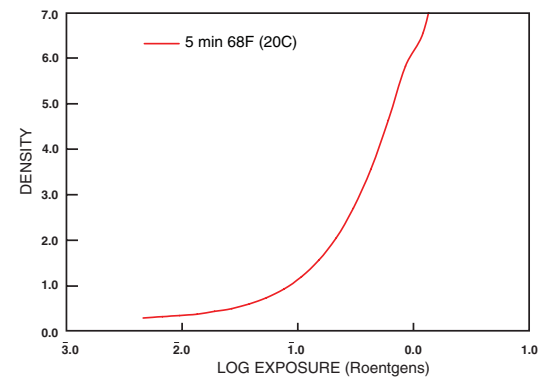
220 kV Direct X-rays with lead screens

### Processing:

KODAK INDUSTREX Processor  
KODAK INDUSTREX Chemicals

### Densitometry:

Diffuse Visual



### Exposure:

220 kV Direct X-rays with lead screens

### Processing:

Manual; KODAK INDUSTREX Single Part Developer Replenisher

### Densitometry:

Diffuse Visual

**Kodak**

Licensed Product

**Carestream** HEALTH

Carestream Health, Inc. Rochester, N.Y. 14608  
© Carestream Health, Inc. 2007. Kodak and the Kodak trade dress are trademarks of Kodak used under license.  
CAT 847 6970

Exclusive manufacturer of **Kodak** INDUSTREX Products

# Kodak Industrex M100

## Film

### WHEN CLARITY IS CRITICAL.



KODAK INDUSTREX M100 Film gives you outstanding sharpness—in fact, we've set the standard in this industry. The film's excellent sensitivity and low speed make it the perfect choice for critical inspections of a wide range of materials. You'll have confidence that you'll find what you're looking for—whether it's a pipe weld, an aerospace engine, or a sculpture that you're imaging.

### The Basics

M100 Film is an ASTM E 1815 Class I film that offers very fine grain with extremely high contrast and definition. And it's versatile—you can use it with direct x-rays or with lead foil screens.

### Recommended Uses

KODAK INDUSTREX M100 Film is available in a wide range of sizes and packaging formats, and it's designed for applications such as:

- Aircraft inspection
- Aero-engines
- Assemblies
- Electrical components
- Castings
- Composites, fibre-reinforced
- Forensics
- Munitions, bomb disposal
- Nuclear applications
- Paintings, sculptures
- Pipelines
- Welded fabrication

### Get the T-Grain Emulsion Advantages

KODAK INDUSTREX Films with T-GRAIN Emulsion offer a brand new, state-of-the-art technology that's specifically designed for industrial radiographic testing applications. What does that mean for you?

### Outstanding Image Quality

With a cool, clean image tone and low noise, you get a sharp, clear image every time.

### Convenient Processing Flexibility

The films work well in standard process cycles—but they're just as effective in longer or shorter process cycles.

### Superb Durability

The films are static resistant, more heat resistant than conventional systems, incredibly sturdy, and you'll get fewer artifacts from handling.



# KODAK INDUSTREX M100 Film

## Processing Options

M100 Film can be processed manually or automatically in a range of processing cycles.

Notice: Observe precautionary information on product labels and Material Safety Data Sheets. Develop with rack and tank, using properly replenished solutions.

## Automatic Processing

See Carestream Health publication TI-2621, *Processing KODAK INDUSTREX Films*, for additional information on automatic processing.

## Film Characteristics (Sensitometric)

ISO/EN exposure conditions: 200/220 kV, lead screens; KODAK INDUSTREX Single Part Developer Replenisher and KODAK INDUSTREX LO Fixer and Replenisher.

KODAK INDUSTREX Processors/Cycles	Base + Fog	Contrast <sup>1</sup>
M431C—8 min 79°F (26°C)	0.19	5.4
M431C—5 min 86°F (30°C)	0.19	5.25

<sup>1</sup>Contrast calculated between net densities of 1.5 and 3.5.

## Manual Processing

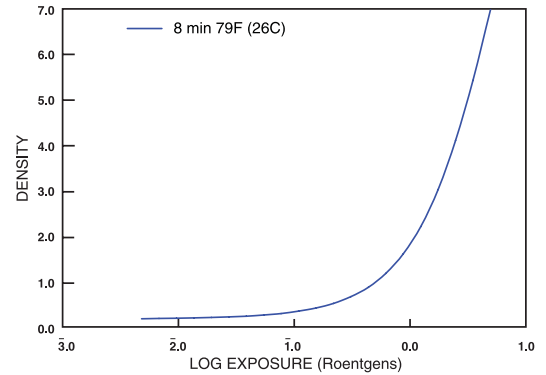
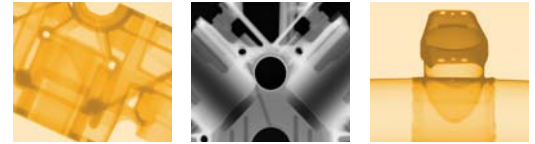
See Carestream Health publication TI-2643, *Guide to Manual Processing of KODAK INDUSTREX Films*, for additional information on manual processing.

Develop with rack and tank, using properly replenished solutions.

Developer	Temperature	Recommended Time (Minutes)	Agitation
KODAK INDUSTREX Single Part Developer	68°F (20°C)	5	Intermittent
Replenisher	72°F (22°C)	4	(5 seconds, every 30 seconds)
	75°F (24°C)	3	
	79°F (26°C)	2	

## For More Information

To learn more about KODAK INDUSTREX M100 Film and other Carestream Health NDT products and solutions, contact a Carestream Health representative at 877-865-6325 ext 714 or visit [www.carestreamhealth.com/go/ndt](http://www.carestreamhealth.com/go/ndt).



### Exposure:

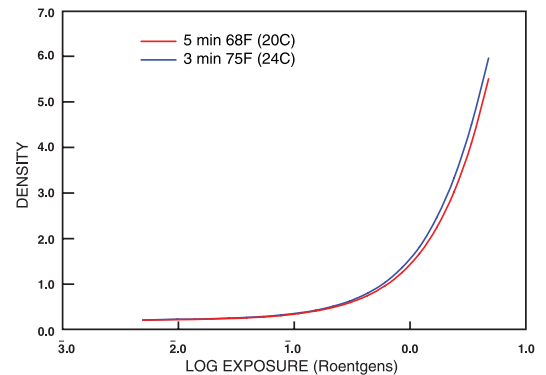
220 kV Direct X-rays with lead screens

### Processing:

KODAK INDUSTREX Processor  
KODAK INDUSTREX Chemicals

### Densitometry:

Diffuse Visual



### Exposure:

220 kV Direct X-rays with lead screens

### Processing:

Manual; KODAK INDUSTREX Single Part Developer Replenisher

### Densitometry:

Diffuse Visual

**Kodak**

Licensed Product

**Carestream**   
HEALTH

Carestream Health, Inc. Rochester, N.Y. 14608  
© Carestream Health, Inc. 2007. Kodak and the  
Kodak trade dress are trademarks of Kodak used  
under license.  
CAT 137 5617

Exclusive manufacturer of **Kodak** INDUSTREX Products



# Kodak Industrex MX125

## Film

### UP TO THE CHALLENGE.



Simply put, KODAK INDUSTREX MX125 Film is tough. Tough as nails. Its static resistance is unparalleled in the industry, and its heat resistance is remarkable. The film is extremely durable; it can withstand the toughest handling (and even darkroom practices). It can also survive high humidity, and it's much less susceptible to handling artifacts than most films.

### The Basics

MX125 Film incorporates Carestream Health's patented T-GRAIN Emulsion technology. This medium-speed film offers very fine grain and very high contrast. It has excellent sensitivity, so it's perfect for critical radiography—especially with high energy. You can use it with direct x-rays or with lead foil screens. This film is classified as ASTM E 1815 Class I.

### Recommended Uses

KODAK INDUSTREX MX125 Film is available in many sizes and packaging formats, and it's designed for a wide range of applications, including:

- Aircraft inspection
- Aero-engines
- Archeological artifacts
- Assemblies
- Electrical components
- Castings
- Composites, fibre-reinforced
- Forensics
- Forestry
- Munitions, bomb disposal
- Nuclear applications
- Paintings, sculptures
- Pipelines
- Welded fabrication

### Get the T-Grain Emulsion Advantages

KODAK INDUSTREX Films with T-GRAIN Emulsion offer a brand new, state-of-the-art technology that's specifically designed for industrial radiographic testing applications. What does that mean for you?

### Outstanding Image Quality

With a cool, clean image tone and low noise, you get a sharp, clear image every time.

### Convenient Processing Flexibility

The films work well in standard process cycles—but they're just as effective in longer or shorter process cycles.

### Superb Durability

The films are static resistant, more heat resistant than conventional systems, incredibly sturdy, and you'll get fewer artifacts from handling.

# KODAK INDUSTREX MX125 Film

## Processing Options

MX125 Film can be processed manually or automatically in a range of processing cycles.

Notice: Observe precautionary information on product labels and Material Safety Data Sheets. Develop with rack and tank, using properly replenished solutions.

## Automatic Processing

See Carestream Health publication TI-2621, *Processing KODAK INDUSTREX Films*, for additional information on automatic processing.

## Film Characteristics (Sensitometric)

ISO/EN exposure conditions: 200/220 kV, lead screens; KODAK INDUSTREX Single Part Developer Replenisher and KODAK INDUSTREX LO Fixer and Replenisher.

KODAK INDUSTREX Processors/Cycles	Base + Fog	Contrast <sup>1</sup>
M431C—8 min 79°F (26°C)	0.20	5.15
M431C—5 min 86°F (30°C)	0.20	5.05

<sup>1</sup>Contrast calculated between net densities of 1.5 and 3.5.

## Manual Processing

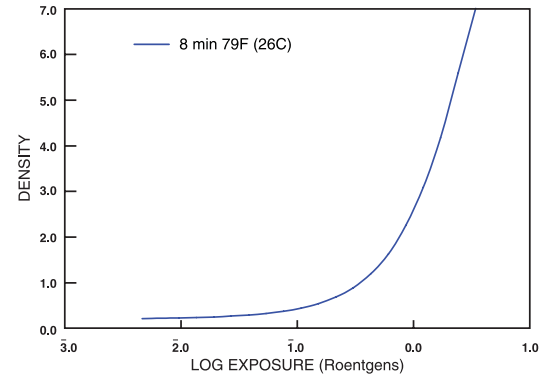
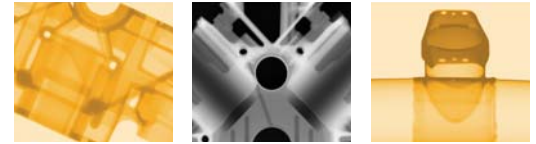
See Carestream Health publication TI-2643, *Guide to Manual Processing of KODAK INDUSTREX Films*, for additional information on manual processing.

Develop with rack and tank, using properly replenished solutions.

Developer	Temperature	Recommended Time (Minutes)	Agitation
KODAK INDUSTREX Single Part Developer	68°F (20°C)	5	Intermittent
Replenisher	72°F (22°C)	4	(5 seconds, every 30 seconds)
	75°F (24°C)	3	
	79°F (26°C)	2	

## For More Information

To learn more about KODAK INDUSTREX MX125 Film and other Carestream Health NDT products and solutions, contact a Carestream Health representative at 877-865-6325 ext 714 or visit [www.carestreamhealth.com/go/ndt](http://www.carestreamhealth.com/go/ndt).



### Exposure:

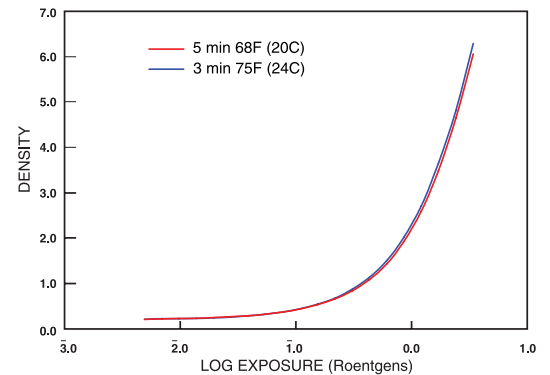
220 kV Direct X-rays with lead screens

### Processing:

KODAK INDUSTREX Processor  
KODAK INDUSTREX Chemicals

### Densitometry:

Diffuse Visual



### Exposure:

220 kV Direct X-rays with lead screens

### Processing:

Manual; KODAK INDUSTREX Single Part Developer Replenisher

### Densitometry:

Diffuse Visual

**Kodak**

Licensed Product

**Carestream**   
HEALTH

Carestream Health, Inc. Rochester, N.Y. 14608  
© Carestream Health, Inc. 2007. Kodak and the  
Kodak trade dress are trademarks of Kodak used  
under license.  
CAT 802 0406

Exclusive manufacturer of **Kodak** INDUSTREX Products

# Kodak Industrex T200

## Film

### WHEN CLARITY IS CRITICAL.



KODAK INDUSTREX T200 Film is recommended for critical imaging applications, since it can be used in multiple film loads to provide you with an extended imaging range. Best of all, it incorporates Carestream Health's patented T-GRAIN Emulsion technology.

### The Basics

T200 Film is a medium-speed, high-contrast film with very fine grain. T200 Film is an En 584-1 Class 4 film and our fastest ASTM E 1815 Class I film. It's tough and durable—T200 Film can withstand high temperatures, and it's less susceptible to handling and static artifacts. It's also versatile—you can use it with direct x-rays or with lead foil screens.

### Recommended Uses

KODAK INDUSTREX T200 Film is available in a wide range of sizes and packaging formats, and it's specially designed for applications such as:

- Aircraft inspection
- Aero-engines
- Assemblies
- Electrical components
- Archeological artifacts
- Castings
- Forensics
- Forestry
- Munitions, bomb disposal
- Nuclear applications
- Paintings, sculptures
- Pipelines
- Welded fabrication

### Get the T-Grain Emulsion Advantages

KODAK INDUSTREX Films with T-GRAIN Emulsion offer a brand new, state-of-the-art technology that's specifically designed for industrial radiographic testing applications. What does that mean for you?

### Outstanding Image Quality

With a cool, clean image tone and low noise, you get a sharp, clear image every time.

### Convenient Processing Flexibility

The films work well in standard process cycles—but they're just as effective in longer or shorter process cycles.

### Superb Durability

The films are static resistant, more heat resistant than conventional systems, incredibly sturdy, and you'll get fewer artifacts from handling.

# KODAK INDUSTREX T200 Film

## Processing Options

T200 Film can be processed manually or automatically in a range of processing cycles.

Notice: Observe precautionary information on product labels and Material Safety Data Sheets. Develop with rack and tank, using properly replenished solutions.

## Automatic Processing

See Carestream Health publication TI-2621, *Processing KODAK INDUSTREX Films*, for additional information on automatic processing.

## Film Characteristics (Sensitometric)

ISO/EN exposure conditions: 200/220 kV, lead screens; KODAK INDUSTREX Single Part Developer Replenisher and KODAK INDUSTREX LO Fixer and Replenisher.

KODAK INDUSTREX Processors/Cycles	Base + Fog	Contrast <sup>1</sup>
M431C—8 min 79°F (26°C)	0.20	4.7
M431C—5 min 86°F (30°C)	0.20	4.7

<sup>1</sup>Contrast calculated between net densities of 1.5 and 3.5.

## Manual Processing

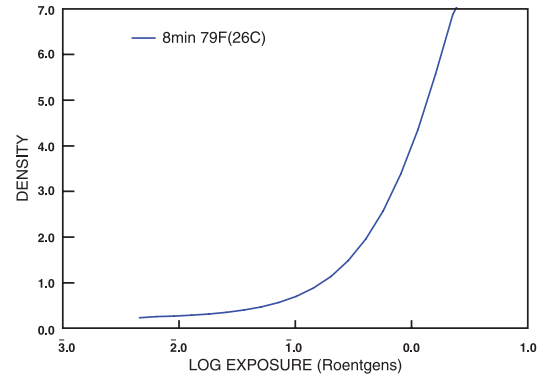
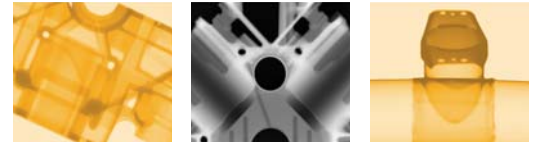
See Carestream Health publication TI-2643, *Guide to Manual Processing of KODAK INDUSTREX Films*, for additional information on manual processing.

Develop with rack and tank, using properly replenished solutions.

Developer	Temperature	Recommended Time (Minutes)	Agitation
KODAK INDUSTREX Single Part Developer	68°F (20°C)	5	Intermittent
Replenisher	72°F (22°C)	4	(5 seconds, every 30 seconds)
	75°F (24°C)	3	
	79°F (26°C)	2	

## For More Information

To learn more about KODAK INDUSTREX T200 Film and other Carestream Health NDT products and solutions, contact a Carestream Health representative at 877-865-6325 ext 714 or visit [www.carestreamhealth.com/go/ndt](http://www.carestreamhealth.com/go/ndt).



### Exposure:

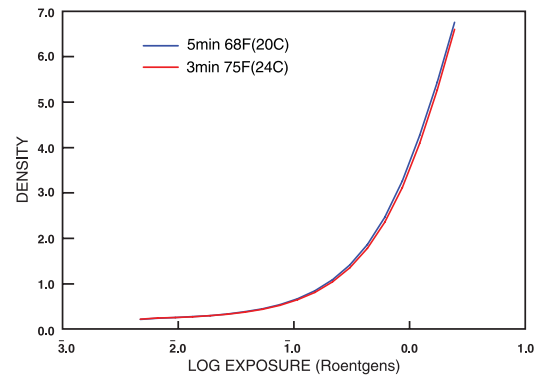
220 kV Direct X-rays with lead screens

### Processing:

KODAK INDUSTREX Processor  
KODAK INDUSTREX Chemicals

### Densitometry:

Diffuse Visual



### Exposure:

220 kV Direct X-rays with lead screens

### Processing:

Manual; KODAK INDUSTREX Single Part Developer Replenisher

### Densitometry:

Diffuse Visual

**Kodak**

Licensed Product

**Carestream** HEALTH

Carestream Health, Inc. Rochester, N.Y. 14608  
© Carestream Health, Inc. 2007. Kodak and the Kodak trade dress are trademarks of Kodak used under license.  
CAT 809 8360

Exclusive manufacturer of **Kodak** INDUSTREX Products

# Processing KODAK INDUSTREX Films



## KODAK INDUSTREX Single Part Developer Replenisher

KODAK INDUSTREX Single Part Developer Replenisher is a universal, single-part concentrate used to process all types of non-destructive testing film. As its name implies, this is a single part liquid concentrate for easy mixing. It is compatible with existing automatic processing cycles of 8 minutes and longer, and allows a shorter processing cycle (5 minutes) for all films.

The developer formula allows high photographic consistency and quality, and ensures an efficient use of the developer when using a low replenishment rate and it also reduces any environmental impact. This developer reduces or minimizes operator maintenance due to crystallization, silver deposits, or sludge.

### Features:

- High chemical stability—includes consistent image quality over an extended period of time, improved resistance to aerial oxidation, and low sludge formation
- Designed for use in both automatic and manual processing
- Reduced packaging, less solid waste
- Glutaraldehyde free
- Strengthened “activation power” which allows for fast processing and high productivity
- Outstanding image quality—cold (blue) image “tone” and low granularity
- Reduced environmental impact—lower COD and BOD<sub>5</sub> (5-days Biochemical Oxygen Demand)
- Concentrated (single part) liquid developer provides ease of use
- Can be used in chemical auto-mixers

## KODAK INDUSTREX LO Fixer and Replenisher

This fixer is recommended to process all types of industrial imaging film in automatic and manual processing cycles.

This fixer consists of a single part liquid—just add water to the proper dilution. For use, the concentrate must be diluted with water according to the instructions provided below (see “Mixing Instructions.”)

### Features:

- Low odor
- Improved archivability
- Reduced environmental impact—lower COD and BOD<sub>5</sub> (5-days Biochemical Oxygen Demand)
- Concentrated (single part) liquid fixer provides ease of use
- Designed for use in both automatic and manual processing
- Can be used in chemical auto-mixers

## Compatibility

KODAK INDUSTREX Single Part Developer Replenisher and KODAK INDUSTREX LO Fixer and Replenisher can be used with all KODAK INDUSTREX Films.

## STORING SOLUTIONS

To maintain product quality, these chemicals must be stored in the original package, at a temperature between 5 and 30° C (41 to 86° F). When stored in these conditions, the lifetime is two years from the date of manufacture.

Discard solutions if there is evidence of contamination, dirt, over-dilution, excessive evaporation, or crystallization.





**NONDESTRUCTIVE TESTING EQUIPMENT**

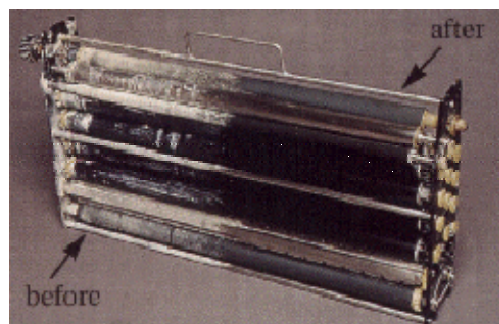
## **CLEAR IMAGE RADIOGRAPHIC CLEANER**

CLEAR IMAGE RADIOGRAPHIC CLEANER was developed and tested in 1996 as a safer and environmentally friendlier alternative for cleaning X-Ray film processors. Since its introduction, service engineers nationally and internationally have praised CLEAR IMAGE RADIOGRAPHIC CLEANER for its effectiveness, safety, ease of use, and biodegradability.

CLEAR IMAGE RADIOGRAPHIC CLEANER is a working biodegradable solution for cleaning radiographic film processors, film labs and radiology labs. It effectively cleans all parts of the film processor including the developer tanks and rollers, the fixer tanks and rollers, the wash tank, and the external panels. It is also a superior cleaner for the mixing units, the silver recovery units, and fixer and developer chemical spills and stains.

CLEAR IMAGE RADIOGRAPHIC CLEANER is much safer to use than the traditional acid developer cleaners and the toxic three-part cleaners. CLEAR IMAGE RADIOGRAPHIC CLEANER is biodegradable, acid-free, chromate-free, non-toxic and it will not stain or burn holes into the service engineer's clothes/uniforms.

CLEAR IMAGE RADIOGRAPHIC CLEANER is simple to use. The product is applied with a sprayer that delivers a thick foam to the surface being cleaned. After waiting a short time for CLEAR IMAGE RADIOGRAPHIC CLEANER to "work," the area is scrubbed lightly with a non-abrasive pad and rinsed thoroughly.



**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



## NONDESTRUCTIVE TESTING EQUIPMENT



**Clear Image  
Radiographic  
Cleaner  
makes Daily  
Cleaning Safe  
and Simple...**

Processor manufacturers recommend that the crossovers and squeegees be cleaned daily. It's preventative maintenance and significantly improves the image quality.

With *Clear Image Radiographic Cleaner* you can quickly, easily, and safely

perform the recommended daily maintenance. No mixing, no waiting, *no acid*. Grab the bottle, spray-on, wash-off. You keep the processor running smoothly and the images clear.

\*Always follow manufacturer's recommended cleaning procedures.

**CLEAR  
IMAGE**

RADIOGRAPHIC CLEANER

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**

**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



**NONDESTRUCTIVE TESTING EQUIPMENT**

# ***NEW Hydra ADE24/TX***

## ***Automatic Anti-Algae System***

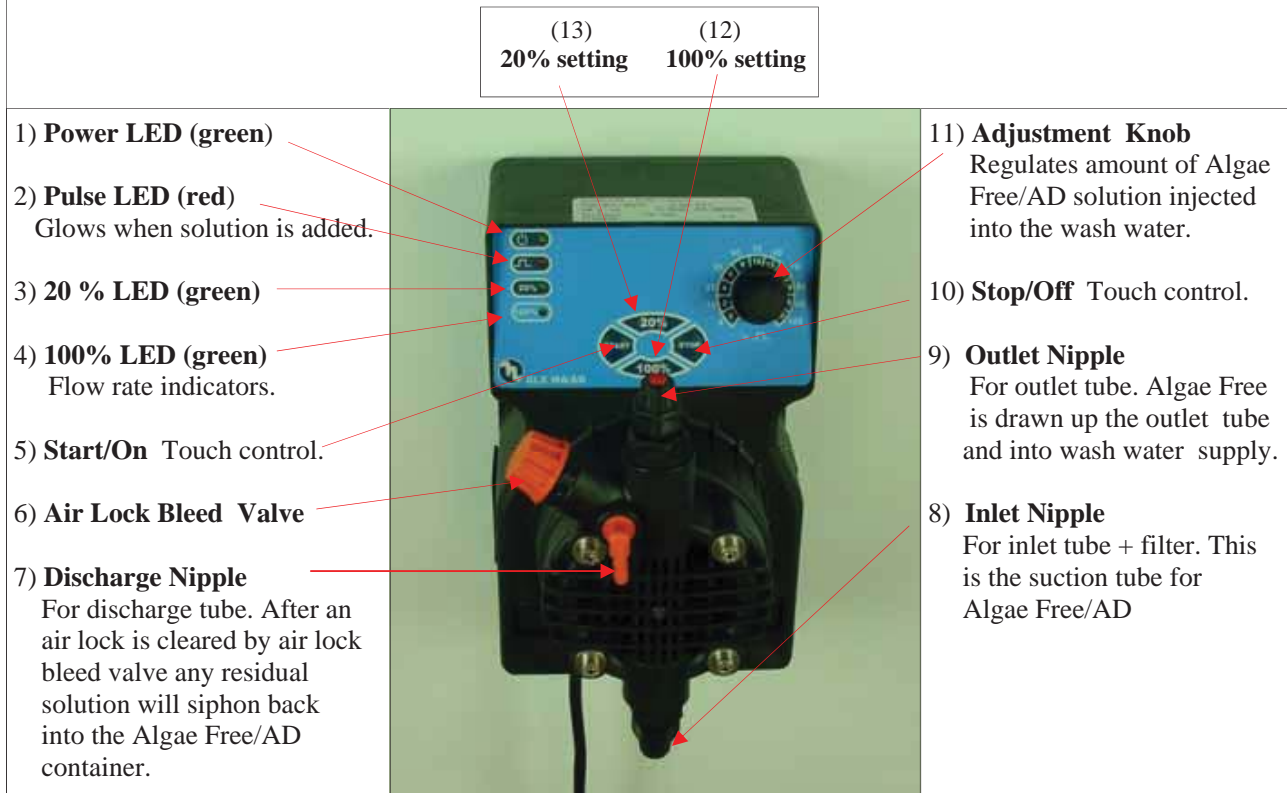
### ***NEW IMPROVED ADE24 SYSTEM WITH ADDED FEATURES***

**LED indicator lights for Power, Pulse and Flow Rates.**

**Easy to Read and Easy to Use Controls**

**Compact Robust Waterproof Unit**

**Air Lock Bleed Valve**



**ADE24/TX Dosing Pump Dimensions**  
4.8 inches by 8.4 inches

**6805 COOLRIDGE DR | TEMPLE HILLS MD 20748**  
**301-449-7300 | 800-638-0554 | FAX 301-449-7011**  
**EMAIL: sales@detek.com**

## **The Hydra ADE24/XT Algae Free/AD Fully Automatic Anti-Algae Free Dosing Unit**

The Hydra ADE24/XT contains many new features. With upgraded specifications both installation engineers and customers have found that the new layout is easier to read and operate.

The new black, streamlined polypropylene moulded casing is even more robust and is now totally waterproof to IP65 specifications.

The addition of LED display down the left hand side of the pump face, ensures that both you and your customers can now see at a glance when the system is:

- (a) Switched ON or OFF.
- (b) When Algae Free/AD solution is being injected
- (c) Which current flow rate that the pump is set on. Either 20% (normal) or 100% (priming).

To set the dosage simply press 20% setting on the front dial and turn the dial to 3% or above depending upon **Algae Free/AD** dosage required. Note: On water saver processors minimum setting is normally 6%

For priming the pump the 100% setting is used.

The addition of a self bleeding valve eliminates the removal of the pump tubing to clear air locks, making air lock removal simple and safe. An extra pipe fitted on the front of the pump via a discharge nipple allows Algae Free/AD to feed straight back into the 5 litre container when the air lock is cleared

### **Detailed Description of ADE24/TX Pump Facia**

- 1) **Power LED (Green)** Once the unit is switched on this will glow green. This eliminates the problem of the unit being switched off without the customer being aware. At the end of the processing day there is no need to switch the unit off. It will not operate unless the processor is processing.
- 2) **Pulse LED (Red)** Every time that the unit adds a shot of Algae Free/AD this LED will glow red. You can now ensure that the unit is dosing correctly.
- 3) **20% LED (Green)** The normal setting for the system is on the 20% scale. This LED will ensure right setting is visible.
- 4) **100% LED (Green)** This setting is only used to prime the pump i.e. the pump will pump harder on this setting.
- 5) **Start/On Touch Control.** Switches the power to the ADE24/TX unit ON.
- 6) **Air Lock Bleed Valve.** Only used in the event of an air lock. See full instructions for use supplied with ADE24/TX system.
- 7) **Discharge Nipple.** A 'soft' polythene tube is supplied which fits onto nipple. This pipe is inserted into the **Algae Free/AD** container along with the outlet tube. When the airlock is cleared using the Air Lock Bleed Valve any residual solution will siphon back into the **Algae Free/AD** container.
- 8) **Inlet Nipple.** The 'soft' polythene inlet tube is connected onto this nipple. This tube has a filter/weight on the other end and is inserted into container of **Algae Free/AD**.
- 9) **Outlet Nipple.** The 'stiff' polythene outlet tube is connected to this nipple. It is this tube that carries the **Algae Free/AD** into the water supply feeding the wash tank/s.
- 10) **Stop/Off.** Switches the power to the ADE24/TX unit OFF.
- 11) **Adjustment Knob.** Regulates the amount of **Algae Free/AD** added to the water supplying the processor wash tanks. Normal reading is the **BLACK inner dial** and settings will be from **3%** upwards depending upon wash tank size and amount of water per minute. Full information is given by installation engineer or Hydra Help Desk. Once on the correct setting this should not be changed without contacting Hydra or installation engineer.
- 12) **100% Setting Switch.** Touch control to set percentage rate. Normally only used for priming pump.
- 13) **20% Setting Switch.** Touch control to set percentage rate.  
Note: This is the normal setting for ADE/24/TX dosing pump.

**IMPORTANT: Do not use bleach or any other product NOT manufactured or tested by Hydra through the Hydra ADE24/TX system. To do so will cause internal corrosion and pump failure and Will invalidate any warranty.**



# NOVA

## Compact Film Processor



Straightforward in design and operation.  
Superior in quality and performance.

GE Inspection Technologies brings you the all-new NOVA, part of the proven Agfa NDT Film Systems and yet another dedicated processor designed and built specifically for the industrial NDT testing environment. Smart, robust, economic and automatic, it fills the void for a compact processor that performs rugged NDT testing and provides the quality and features users need.

The NOVA is compact to take up little space in labs. It is extremely lightweight and transportable. It consists of state-of-the-art electronics and materials, making it easy to operate and service. And it offers an optional package of product add-ons, called the NOVA Comfort Kit, which allows you to upgrade the processor's performance with easy-to-fit enhancements. Above all else, it continues the reputation of Agfa NDT equipment for assured performance while yielding a superb price/quality ratio.

As an example, its extremely low consumption of power during processing (a max. of 1700 watts) results in significant cost savings over its lifetime (NOVA is equipped with an intelligent power management system).

Whether you are a company with limited film processing needs or one requiring many processors across multiple locations, the NOVA is an excellent choice. Versatile and accommodating, it is as much at home in a small lab as it is on-site at an extensive pipeline project.

Thoroughly tested with the full line of Agfa NDT films and chemicals, you can use the NOVA with utmost confidence to produce optimal film image results.

The entire Agfa NDT Film Systems is backed by GE's highly trained technicians and specialists -- experts who stand ready to assist you with technical support and workflow assistance. Like the processor itself, they are focused on delivering quality and performance to make your job easier.



# Makes simple work of achieving excellent film output

## A smart choice whatever your field

Our compact processor answers such a variety of needs that companies of every size and purpose will consider it the preferred compact film processor on the market.

The NOVA is ideal for...

- Inspection companies that conduct on-site testing and split their teams along pipelines, refineries and other locations to increase production, thereby needing multiple processors easy to transport and use
- Manufacturing or testing labs using manual processing and looking for a way to automate their processing
- Companies with occasional contracts and needs, requiring film consumption from 10 to 50 films per day
- Companies in need of a back-up processor to provide them flexibility in film processing and to complement their digital solutions.

## User-friendly features

- Compact Size.  
Takes up only 4.3 sq. ft. or 0.40 m<sup>2</sup> of floor space.
- Well-Conceived, Lightweight Construction.  
Constructed of stainless steel, aluminum and PVC to be corrosion resistance and strong. Yet lightweight (max. 176.37 lbs or 80 kg, excl. NOVA Comfort Kit) and durable for long life performance.
- Globally Adaptable.  
Comes in a standard version with state-of-the-art electronics. Worldwide “plug and play” feature allows you to adapt it to any standard outlet, accommodating all voltages globally.
- Easy To Use.  
Built with an automatic start/stop function. Film detection with five scanning rollers allow intelligent and economic replenishment depending on the processed film surface. Control display provides visual reference of all process parameters (temperature, dryer settings). An OK light indicates when the next film can be inserted.
- Easy To Self-Serve.  
Lightweight aluminum side covers enable easy access to the machine. Racks are easy to remove, clean and service. Circulating pumps are easy accessible and can be easily exchanged by the user.
- Light-Tight Cover.  
Designed to protect against light entering the processor, the standard light-tight cover allows the operator to perform other tasks while film feeding into the NOVA Film Processor is ongoing. It also prohibits dust particles from entering the processor to help avoid scratches on the film.



## Proven Agfa NDT Quality

The NOVA offers the benchmark quality and outstanding features for which Agfa NDT processors are the given preference worldwide. These exclusive features include:

- Excellent film quality from the first run. The “Intelligent Replenishment” feature means this processor is

always ready to use, even if it has been idle for several hours. The processor sends a pulse, ensuring fresh chemicals are constantly in the processor tanks to deliver high image quality from the first run to the last.

- Low heat emission. The infrared drying system assures uniform drying of films and keeps heat accumulation in the darkroom to an absolute minimum. Work environment temperatures remain comfortable.
- Extremely quiet operation.

## Outstanding service and support

- Handy, remote monitoring and diagnostics. The processor connects to the PC of the service technician, direct or remotely. All machine data is transferred quickly and reliably.

- Our service personnel, dispatched from our GE Inspection Technologies global service centers, are best qualified to service and maintain your GE Inspection Technologies equipment.

They offer on-call repair and maintenance visits as well as standard and custom service agreements (Basic, Extended, Premium).



## Easy to upgrade with the NOVA Comfort Kit

Because some applications require enhanced operation beyond the processor's standard features, GE Inspection Technologies presents the NOVA Comfort Kit, a package of film processor enhancements, including:

- A Water Saving Solenoid Valve and Water Replenishment Pump. This feature is especially popular in regions where water consumption is monitored. It allows the amount of

wash water supplied to be linked to the surface of the film entering the wash section to accommodate strict environmental rules.

- A Water Filter with cartridge. This feature is especially useful to filter the incoming water into the processor thus guaranteeing excellent film quality as it filters all particles out of the water inlet.

- Two replenishment tanks of 30 Liters. These two replenishment tanks can easily be positioned under the table support to save space in the darkroom.

# Technical Specifications – NOVA

## Type number: 7070/100

Dimensions:	Length	35 cm (table) + 59 cm (unit) + 25 cm (tray) or 119 cm 13.78" (table) + 23.23" (unit) + 9.84" (tray) or 46.85"
	Width	68 cm / 26.77"
	Height	57 cm / 22.44"
Weight:	Empty	80 kg / 176.37 lbs
	Filled	110 kg / 242.51 lbs
Tank capacities:	Developer	10 liters / 2.6 gallons
	Fixer	10 liters / 2.6 gallons
	Water	10 liters / 2.6 gallons
	Water level sensor	Yes
Water connection:	Cold tap water	min. 5°C / 41°F, 3/4" connection
Water pressure:	min/max	1.0 - 6.0 bar
Power:	Voltage	100 - 120 V, 200 V - 208 V, 230 - 240 V
	Amperage	8.5 A, 7.5 A, 6.5 - 7.3 A
	Frequency	50/60 Hz
	Consumption	1700 Watt max.
	Intelligent power management software	
Processing cycle:	Standard	100 seconds developer immersion time
	Range	12 - 150 seconds developer immersion time
Film:	Capacity	30 films/hour of 35 x 43 cm or 14 x 17" at standard cycle
	Width	3.5 cm / 1.4" up to 43 cm / 17"
	Size	6 x 12 cm / 2.4" x 4.7" minimum
	Roll film	from 3.5 cm / 1.4" width up to any length

### NOVA Standard Delivery (code EQFKZ) includes

- NOVA Table-top Film Processor
- Light-tight Cover
- Customer service documentation and spare parts list
- Operation manual
- International mains connection terminal

### NOVA Comfort Kit (code EQPSL) includes

- Water saving solenoid valve
- Water circulation pump
- Water filter with cartridge
- Two Replenishment Tanks of 30 Liters

### Accessories

- Table Stand code 3BNMQ
- Two Replenishment Tanks of 30 Liters code 3779N
- Water Filter with Cartridge code EM3YK

### Peripherals

- Agfa NDT Mixer code 3U66F



CE sign



GS sign



USA/Canada  
NRTL sign



# NDT U

## Universal Film Processor

With the NDT U film processor, you have at your disposal the most universal processor from our film processor product line. The NDT U combines simplicity, reliability and universal use in one processor.

It is specially designed for customers who use medium-sized quantities of film. The NDT U is very versatile and processes sheet film as well as roll film of any length. The ease of use, the ease of maintenance and its use for every application are the main advantages of the NDT U film processor.



### Universal use

The NDT U integrates all the know-how from the extremes of the off-shore environment to the ultra high quality of on-shore nuclear installations and in combination with its capability to process any length of roll film.

The off-shore requirement for 90 sec. processing has resulted in an off-shore version next to the standard version. It's easy to switch from one type to the other by changing the developer rack.

### Reliable processing

The NDT U is an electro-mechanical processor which is, no matter where it is installed, extremely dependable.

The solid construction and the careful selection of the materials used make the NDT U a highly reliable processor.



## User-friendly

Thanks to the functional design with switches on the feed table, the processor can be operated easily. The temperature of both the developer and the dryer can simply be set, step by step. In addition, the NDT U is also exceptionally quiet.

## Precise replenishment

The film area is measured on entry by 5 detection rollers. This measurement means that replenishment is controlled much more precisely than when the film is measured in length only. It also keeps the replenishment quantity to a minimum.

## Minimal processing costs

During film processing only a small volume of water is used, with consequent benefits for the environment. Moreover the machine uses less energy, thanks among other things to the infrared drying system.

## Low heat generation

The infrared drying system not only guarantees the uniform drying of your films, it also ensures that very little heat is generated in the darkroom. As a result, the darkroom remains at a comfortable working temperature.

## Unique daylight system

The NDT FEEDER can be connected to the NDT U in a simple manner. Just remove the feed tray and fit the NDT FEEDER in its place. When combined with the NDT FEEDER, the NDT U becomes a very practical daylight film system. In case the NDT U is used without the NDT FEEDER, a light tight cover can be ordered optionally. Once the films are positioned on the film feed table the light tight cover can be closed. From then on the darkroom can be illuminated.

## Features

- Mainly electro-mechanical components
- Processing cycle time:  
adjustable between 1.5/2/2.5 min for off-shore applications,  
choice between 5/6/7/8/9/10/11/12 min for standard applications
- Lower liquid level in the processor tanks
- Double liquid overflow (on both sides of each processing tank)
- Extra bottom plate and air filter

## Advantages

- High functional reliability
- Not sensitive to voltage fluctuations
- Prevents the liquids to overflow
- Sufficient drainage on large ship movement
- Optimal protection against dust intrusion



# Technical specifications - NDT U

Film processing	Type	Power supply connection
NDT U Standard	8196/148	200, 208, 230-240 Volt/ 50, 60 Hz
NDT U Offshore	9196/149	200, 208, 230-240 Volt/ 50, 60 Hz

## Characteristics

Dimensions	Length (max)	125 cm (incl. tray)
	Width	68 cm
	Height (max)	106 cm
	Footprint	73 x 68 cm
Weight	Empty	175 kg
	With tanks	250 kg
Fixed electrical connection		16 A
Power supply	Voltage	200-240 V
	Frequency	50/60 Hz
Power consumption	max	3.300 W
	stand-by	1155 W
Dryer	No. of dryer settings	4
	Standard setting	3
Tank volume	Developer	24 l
	Fixer	20 l
	Final washing	20 l

The following data apply to film processing with the standard cycle of 8 minutes

## Film

Processing time	Standard	8 min/28°C
	Limits	1.5 to 12 minutes
Processing speed	Standard	23 cm/min
	Limits	128 to 15.4 cm/min
Film	Types	AGFA NDT and all industrial X-ray films suitable for automatic processing
	Width (max.)	43.2 cm
	Length (max.)	any length
	Smallest size	6 x 12 cm
	Film capacity	9 x 12 cm
	35 x 43 cm	40 films/hour

## Fluids

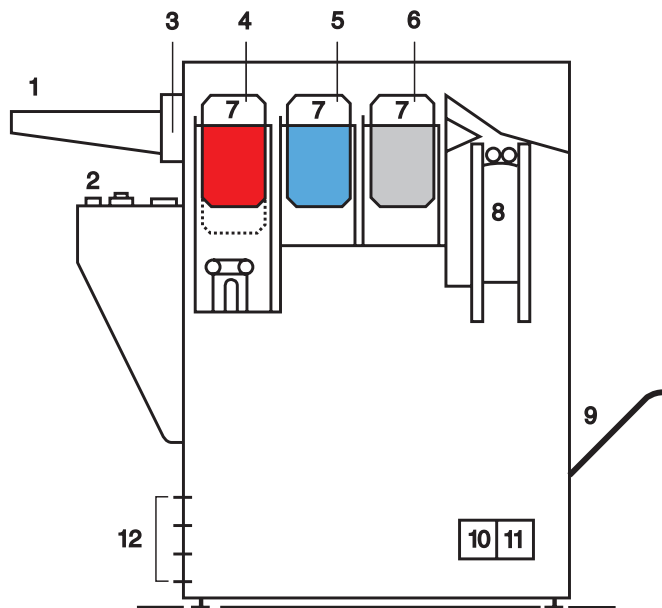
Water	Connection	Fixed 3/4" connection
	Standard consumption	6 l/m <sup>2</sup>
	Consumption limits	6 - 20 l/m <sup>2</sup>
	Pressure (min/max)	1-8 bar
	T° (min)	5° C
	pH value	6.5 to 8

## Chemistry

Auto dev.	Dev.	G 135 + G 135 S starter
	Fix.	G 335
Standard replen.	Dev.	900 ml/ m <sup>2</sup>
	Fix.	1200ml / m <sup>2</sup>
Replen. limits	Dev/Fix.	200-1500 ml/m <sup>2</sup>
Standard T°	Dev/Fix.	28° C
Temp. limits	Dev/Fix.	25-40° C
Warm-up time	from 20 to 28° C	8 min.

## Operating diagram

- 1 Film feed tray
- 2 Control panel
- 3 Film surface detection rollers
- 4 Developer tank
- 5 Fixer tank
- 6 Water tank
- 7 Removable upper racks
- 8 Infra-red dryer
- 9 Film collection tray
- 10 Developer replenishment pump
- 11 Fixer replenishment pump
- 12 Drain



## Accessories

- Darkroom panel 39X91
- Water filter with filter cartridge EM3YK
- Two replenishment tanks of 30 l 3779N
- Two replenishment tanks of 80 l 3778L
- Light tight cover 38KTB

## Peripheral equipment

- NDT MIXER 50 Hz 3U66F
- NDT FEEDER 50/60 Hz 3677A
  - UNIVERSAL magazine 368AJ
  - FLIPTOP magazine 3679E

## Cleaning material

- AGFA NDT FIXCLEAN 37S2J
- AGFA NDT DEVCLEAN EBMBU





# NDT S eco

## Ecological Film Processor

The NDT S eco is the best way forward to become ecologically responsible. This machine is specially designed to meet the strictest standards for silver content in wash water. The secret lies in the double fixing tank with which the NDT S is equipped.

The „cascade fixing“ system ensures that the amount of silver in the wash water is only 40 mg/m<sup>2</sup>, thus remaining within the limit < 50 mg/m<sup>2</sup> which we expect to be introduced as the European norm in the future.

However the NDT S eco goes even further with significant reduction in the amount of replenishment.

With the NDT S eco, ecology goes hand-in-hand with economy.



### Cascade fixing

The cascade fixing system is an entirely new concept for processing X-ray films. The NDT S eco processor is built with two successive fixing tanks replenished on the counterflow principle. The result is nothing less than revolutionary in terms of the amount of silver in the wash water.

The cascade fixing principle is basically very simple: the exposed film is first developed in the developer tank and then washed in the intermedi-

ate washing tank. The intermediate washing system ensures that there is hardly any carry-over of developer into the fixing tanks, thus keeping the fixer bath in optimum condition. The intermediate washing also prevents development faults occurring on the film.

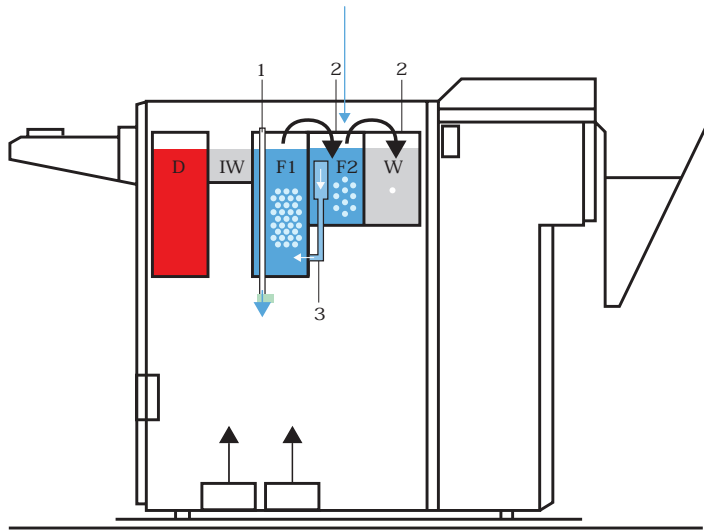
The film is then 100% fixed in the first fixer tank and then rinsed once more in the second fixer tank. Since fixer replenishment is carried out in the second fixer tank, the concentration of silver in this tank remains very low. There is also very little carry-over of silver into the water tank, so that the waste water complies with the most stringent standards.

Fixer replenishment works on the counterflow principle, with the first fixer tank being replenished from the overflow of the second fixer tank.

An added advantage of this is that nearly all the silver released in the fixing stage ends up in the overflow from the first fixing tank. This ensures optimum silver recovery.

This unique film processing system ensures that the amount of silver in the wash water from the NDT S eco processor is 15 or even 25 times lower than in a conventional processing system.





- AGFA NDT G 335 - Replenishment rate 700 - 1200 ml/m<sup>2</sup>.
- Ecological performance with regards to silver in the wash water (depending on requirements):
  - at fixer replenishment of 700 ml/m<sup>2</sup> an Ag content of 40 mg/m<sup>2</sup> (complying with standard < 50 mg/m<sup>2</sup>), corresponding to a concentration of 3 ppm.
  - at fixer replenishment of 1200 ml/m<sup>2</sup> a concentration of maximum 1 ppm is reached.

- D Developer tank
- IW Intermediate wash tank
- F1 Fixer tank 1
- F2 Fixer tank 2
- W Final wash tank
- 1 Overflow F1
- 2 Transfer of residues
- 3 Link between F1 and F2 in the direction of F1

When set to the 5 minute cycle, the NDT S eco processes no less than 51 cm of film per minute. It is in this cycle that the basis is formed for the "Supreme eco Film System". The only system in which the AGFA NDT film, chemistry and processor are all carefully matched and tailored to ensure the best possible ecological results in terms of silver in the wash water and low chemistry consumption and waste products.

## Processing cycles

The microprocessor has 7 pre-programmed processing cycles, varying between 1.5 to 12 minutes. These standard cycles can be set quickly and easily.

Simply select the required cycle time on the display and the other processing parameters such as development temperature, dryer level, fixing temperature and replenishment rates are adjusted automatically.

Another feature is "customised processing"; in addition to the standard cycles, you can manually adjust the processing speed from 5 to 12.5 minutes, in steps of 30 seconds.

Furthermore the processing parameters can be locked, and protected by a special password.

## Reliable electronics

The NDT S eco is equipped with highly reliable electronics, designed to give security of operation.

All processing parameters including temperature, speed, replenishment quantities and drying capacity are controlled by a microprocessor.



## Superior image quality

The NDT S eco is perfectly suited to applications that demand the highest image quality. The technology in terms of rack construction and roller configurations has proved its worth in our previous processors.

A microprocessor provides "smart" control of all the process functions. Among other things, this results in perfect, even drying of your films in all ambient conditions.

Whether you want to develop slowly or quickly, whether you want to process roll films or sheet film of different sizes ... with the NDT S eco it doesn't make any difference: the film quality remains consistently high.

## Precise replenishment

The surface area of the film is accurately measured on entry by 11 detection rollers. This unique method of area scanning controls the replenishment far more precisely than a length only measurement. Thus keeping replenishment usage to a minimum.

## Minimum processing costs

It goes without saying that this precise control of replenishment usage also ensures lower chemistry consumption, and therefore lower costs.

Also the water consumption is related to the film surface scanned with consequent benefits to the environment. When all the films have left the processor, it automatically switches to standby. This together with less replenisher motor use and infrared drying means less consumption of electricity.

The NDT S eco also has a "drive cycle", which in standby mode activates the roller transport mechanism sporadically for short periods of time.

This drive cycle keeps the energy consumption to an absolute minimum and increases the life of your processor considerably.

## Large capacity

The NDT S eco can be set to either a 5 or an 8 minute cycle. In both cases, the throughput of the NDT S eco is sufficient to meet the needs of large film users or companies with high production peaks.

## User comfort

- Multifunctional drainage system

As a totally new and future-oriented feature, the NDT S eco is equipped with three-way drainage valves. This makes it simple for photochemicals and cleaning chemicals to be directed to the correct collection tank. It also prevents the formation of toxic fumes in the waste chemical collection tank.

- Easy maintenance

NDT S eco only needs an absolute minimum of maintenance.

The top parts of the racks can easily be removed and cleaned separately, without having to take the racks out of the tanks.

The film sensor rollers on the feed tray need to be cleaned regularly, and the construction of the NDT S eco is specially designed to facilitate this task. The rollers can easily be reached by removing the feed tray.

In order to prevent algae growth, the wash water is automatically drained when the machine is switched off.

- Clear operating panel

The operating panel provides visual information about the processing parameters, including the current processing temperature, the cycle time, the dryer setting, the replenishment quantities, the OK indication for film input and the remaining cycle time.

As befits such a universal machine, there is a choice of 12 languages for the display messages. The temperature of the developer and dryer can be incrementally adjusted on the control panel, to suit the processing program chosen.



- Adjustable receiving tray

The film receiving tray of the NDT S eco is ideal: it can easily be adjusted to suit sheet film, welding formats (from 6x12 cm upwards) and roll film.

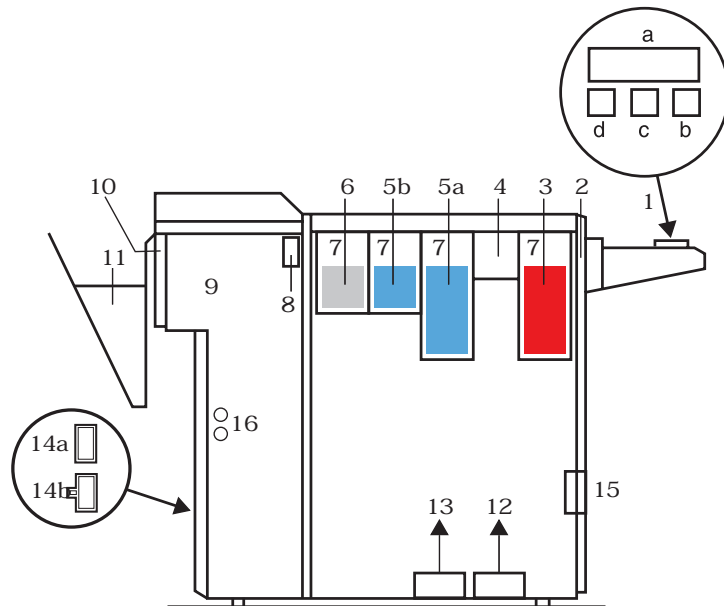
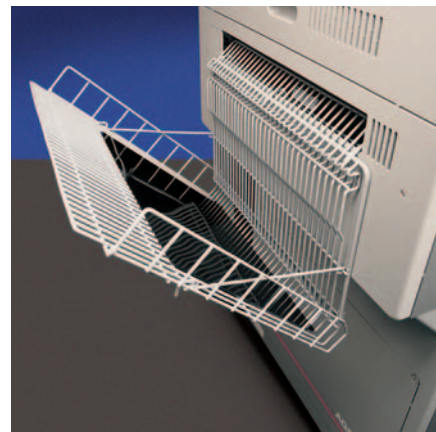
Your processed films will always be collected in the tray in the correct order.

- Unique daylight system

When combined with the NDT FEEDER, the NDT S eco becomes a unique and very practical daylight system.

The NDT FEEDER automatically follows the processing speed of the NDT S eco, even when the speed is altered.

In cases where the NDT S eco is used without a NDT FEEDER, an optional light-tight cover can be ordered. Once the films are positioned on the film feed table the cover can be closed and the darkroom illuminated.



- |                             |   |
|-----------------------------|---|
| 1. Film feed table          | 8. Distribution rollers                             |
| a. LCD display              | 9. Infrared dryer                                   |
| b. Menu selection           | 10. Film output                                     |
| c. Increase setting         | 11. Film receiving tray                             |
| d. Decrease setting         | 12. Replenishment pump for developer                |
| 2. Film area scanning       | 13. Replenishment pump for fixer                    |
| 3. Developer tank           | 14a. On/off switch                                  |
| 4. Intermediate wash tank   | 14b. Earth leakage circuit breaker (ELCB)           |
| 5a. Fixer tank F1           | 15. Three-way valves for draining the machine tanks |
| 5b. Fixer tank F2           | 16. Overheating protectors for developer and fixer  |
| 6. Final wash tank          |   |
| 7. Removable top rack parts |   |

# Technical specifications - NDT S eco

The following tables show the standard values (the right to make modifications is reserved)

<b>Filmprocessing</b>	Type	Power supply connection	
NDT S eco	5320/300	208, 230-240 Volt / 50,60 Hz	
<b>Characteristics</b>			
Dimensions	Length (max)	162 cm (including basket 209 cm)	
	Width	71 cm	
Weight	Height (max)	123 cm	
	Footprint	71 x 111 cm	
Electrical connection	Empty	285 kg	
	With tanks full	426 kg	
	Racks	Upper part	complete
	- developer rack	3.5	15.5
	- intermediate wash rack	-	3
	- fixer 1 rack	3.5	14.5
	- fixer 2 rack	3.5	12.5
	- water rack	3.5	12.5
Power supply	Electricity	16 A	
Dryer	Voltage	208 to 240 V	
	Frequency	50/60 Hz	
	Capacity	max. 3.300 W (during film transport)	
Noise level	No. of dryer settings	20	
	Standard setting	setting 1 for 8 min. cycle	
Tank volume	Film transport	63 dB	
	Stand by	50 dB	
Electrical connection	Developer	41.5 l	
	Fixer1	41.5 l	
	Fixer2	29 l	
	Final washing	29 l	

The following data apply to film processing with the standard cycle of 8 minutes

<b>Film</b>				
Process time	Standard setting	8 min/28°C		
	Ecological setting	5 min/29°C		
	Limits	1.5 to 12.5 minutes		
Process speed	Standard setting	32 cm/min.		
	Ecological setting	51 cm/min.		
	Limits	20.2 to 168.5 cm/min.		
Film	Types	AGFA NDT and all industrial X-ray films suitable for automatic processing		
	Width	max. 43.2 cm		
	Length	min. 12 cm		
	Smallest format	6 x 12 cm		
	Capacity per hour	6 x 12 cm, 720 films/hour		
		35 x 43 cm, 48 films/hour		
	<b>Liquids</b>			
Water	Connection	Permanent connection 3/4"		
	Standard usage	13 l/m <sup>2</sup>		
	Usage limits	1-13 l/m <sup>2</sup>		
	Pressure (min/max)	1-6 bar		
	Temperature (min)	5°C		
	pH value	6.5 to 8		
Chemistry	Standard Developer	G 135 + G 135 S (starter)		
	Ecological Developer	ecoDEV		
	Standard Fixer	G 335		
	Ecological Fixer	ecoFIX		
	Standard replen.	Dev.	900 ml/m <sup>2</sup>	
		Fix	1200 ml/m <sup>2</sup>	
	Ecological replen.	Dev.	550 ml/m <sup>2</sup>	
		Fix	700 ml/m <sup>2</sup>	
	Replen. limits	Dev/Fix	200-1500 ml/m <sup>2</sup>	
	Default temperature setting	Dev/Fix	28°C	
	Ecological temperature setting	Dev/Fix	29°C	
	Temp. limits	Dev/Fix	20-40°C	
	Warm-up time from 18°C to 28°C	22 min.		

# Accessories and peripheral equipment

## Accessories

- Light tight cover 38KTB
- Darkroom panel 39X91
- Water filter with filter cartridge EM3YK
- Two replenishment tanks of 30 litres with a level sensor 3779N
- Two replenishment tanks of 80 litres with a level sensor 3778L

## Peripheral equipment

- NDT MIXER 50 Hz 3U66F
- NDT FEEDER 50/60 Hz 3677A
- UNIVERSAL magazine 368AJ
- FLIPTOP magazine 3679E



GE  
Inspection Technologies

# Structurix Dryer

Fast and efficient film drying



The Structurix Dryer is an instrument that helps customers who process films manually. GE Inspection Technologies now introduces the new optimized version of the Structurix Dryer.



GE imagination at work



## Fast and efficient film drying

With the new Structurix Dryer, films dry more rapidly than in conventional drying cabinets. The drying process immediately starts with no warm-up time needed.

The unit is compact and takes up little space in either the stationary darkroom or mobile lab. The lightweight of the Structurix Dryer makes it easy to move or transport.

The new Structurix Dryer consists of state-of-the-art electronics that makes it easy to operate and service. The new dryer carries the CE label, GS and USA/Canada NRTL sign.

## Easy to operate

The new dryer can be used worldwide. No matter where you plan your operations, the "plug and play" feature allows you to adapt it to any standard outlet, accommodating all voltages globally.

Drying temperature and processing time of the Structurix Dryer can easily be set and adapted to any circumstance. The introduction of step-less speed control enables an even better fine-tuning.

## Excellent results

The manually and thoroughly processed film first passes through the wetting tank. The water comes from a 2,5 liter water bottle.

Most water is removed from the film by means of squeegee rollers prior to the drying section. The film is then hot air dried on both sides and collected in the adjustable film tray.

## Technical specifications

Structurix Dryer		
Type number	9450/200	
Dimensions	Length	60 cm (23.6") with extended receiving tray: 83 cm (32.7")
	Width	63 cm (24.8")
	Height	35 cm (13.8") with bottle: 45,5 cm (17.9")
Weight	Empty	24 kg (53 lbs.)
	Full (with bottle)	27,5 kg (61 lbs.)
Power	Voltage	200-240V / 100-120V
	Amperage	5,0-6,0A / 10,0-12,0A
	Frequency	50 / 60Hz
	Consumption	1600 W
Maximum film width	37 cm (14.6")	

### Dryer Standard Delivery (code EWTWH) includes

- Structurix Dryer
- Instruction Manual
- European and UL (US) mains cable



### GE Inspection Technologies: productivity through inspection solutions

GE Inspection Technologies provides technology-driven inspection solutions that deliver productivity, quality and safety. We design, manufacture and service Ultrasonic, Remote Visual, Radiographic and Eddy Current equipment and systems. Offering specialized solutions that will help you improve productivity in your applications in the Aerospace, Power Generation, Oil & Gas, Automotive or Metals Industry.

Visit [www.ge.com/inspectiontechnologies](http://www.ge.com/inspectiontechnologies) for more information



## NONDESTRUCTIVE TESTING EQUIPMENT

### DENSITOMETERS

#### X-Rite Model 301

#### DETEK P/N ADN-010



A table top film densitometer that provides accurate quality control of your film processor. The 301 is easy to use. Measurements are made on a push and read basis. The 301 has a wide measurement range that allows you to determine base fog and accurately reads film densities up to 5.0. The unit's UL listed and shipped calibrated to standards traceable to NIST.

Other benefits: Easy to read display, rugged construction, lighted table, convenient service, one year warranty – (bulb excluded)

#### Specifications:

Range: 0-4.0D with 1mm aperture, 0-5.0D with 2 & 3mm aperture

Accuracy: +/- 0.2D

Repeatability: +/- .01D

Warm-up time: 60 seconds

Power: 110 VAC – 130 VAC, 60Hz

Null Drift: +/- .03D Max, +/- .01D typical

#### X-Rite Model 331

#### DETEK P/N ADN-031



This unit is economical, portable, and compact but delivers the same performance as the tabletop models. The 331 is designed for convenience. It is lightweight, weighing 1 ½ lbs. The measuring length (throat) is 5.5 in.

#### Specifications:

Range: 0-3.5D with 1mm aperture, 0-4.0D with 2mm aperture

Accuracy: +/- 0.2D, Repeatability: +/- .01D

Size: 2.0"H x 2.9"W x 7.0"L, WT: 1 lb 5 oz

Power: 4 rechargeable AA Ni-Cade batteries and charger (included)

#### PocketPal SM-12

#### DETEK P/N ADN-120



The *PocketPal SM-12* has been designed to meet industry's needs for a small, economical, portable densitometer. With a range of 0 to 4.00D, the *PocketPal SM-12* provides a quick and easy method to verify processing specifications for radiographs or B&W film. The light source is self-contained, just insert the film to the area of interest, push a button and read the density. The 3" (7.62 cm) opening will reach to the center of most field radiographs and to the area of interest in many other sizes. Furnished with 9 Volt alkaline battery, lithium battery power source is optional.

Size: 4.3"L x 1.25"W x 2.5"H, WT: 5.5 oz

#### DETEK P/N ADN-201 X-Rite 5 Step Density Strip (X-Rite Certified)



DETEK P/N ADN-202 Kodak (184-2137) NIST Certified Density Strip, 17 Step(0.2 – 4.20)

#### DETEK P/N ADN-114 Lamp Assembly, Replacement, Model 301

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**

**EMAIL: [sales@detek.com](mailto:sales@detek.com)**

# ESECO

# Speedmaster®

# ND on T

Destructive  
Testing



## Service no other competitor can provide!

- **ESECO has been in business since 1956**
- **SM - 10TCI is available with RS-232 serial Output**
- **Personal Service**
- **Very competitive pricing**
- **Loaner program available when service is required**
- **Cost effective re-certification program**

## SM-10T Densitometer

Measuring Aperture	2mm
Measuring Range	0.00 to 5.00 D
Accuracy	± 0.02 D
Repeatability	± 0.01 D
Preview Stage	2.5"x4"
Warm-up time	None
Film Measuring Depth	7.25" (18.42cm)
Portable Power Source	(2) 9V Alkaline batteries Included
Desktop Power	9V AC Power Supply
Dimensions	4.5"H (11.4cm) 4.5"W(11.4cm) 11"L (28.0cm)
Optional	RS-232 Serial Output (CAT# 5008)



**ESECO - Speedmaster®** is a manufacturer of photographic, graphic arts, and X-ray equipment. Our products are made and serviced in the USA and backed by over forty years of technical experience. All ESECO products come with a one year **No Hassle warranty**.

The **Speedmaster® SM-10T** densitometer assures instant, accurate, and repeatable results that rival the same high standards of more expensive units. Featuring total accuracy of +/- .02 from 0.00 to 5.00 Optical Density and compliant with ANSI / ISO Standard - 5/2.

Low power consuming components and extended battery life features are provided in the automatic "stand-by" mode. For added convenience, it may be operated with the UL/CSA-approved plug-in a/c power adapter furnished with the **Speedmaster® SM-10T**. The **SM-10TCI** is available with a serial interface (CAT# 5008). Use the the **SM-10TCI** model with the **ESECO Speedmaster® QC PAL** Software for maximum quality assurance.

NBS Standard 1009 - Reference Material ID 057901  
ANSI / ISO Standard - 5/2



### DETEK, Inc

6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
301-449-7300 FAX 301-449-7011  
www.detek.com email: sales@detek.com

☆☆☆  
**MADE IN  
USA**

*All prices in USD subject to change without notice*



# ESECO

# Speedmaster®

# ND on T destructive Testing



## Service no other competitor can provide!

- ▶ **ESECO has been in business since 1956**
- ▶ **Personal Service**
- ▶ **Very competitive pricing**
- ▶ **Loaner program available when service is required**
- ▶ **Cost effective re-certification program**

## SM-12 Densitometer

Measuring Aperture	3mm
Measuring Range	0.00 to 4.00 D
Accuracy	± 0.02 D or 1%
Repeatability	± 0.02 D
Warm-up Time	None
Film Measuring Depth	3" (7.65 cm)
Portable Power Source	(1) 9v Alkaline Battery Included Optional 9V AC Power Supply
Weight	5.9oz. (167.2 grams)
Dimensions	2.5"H(6.35cm) 1.5"W(3.81cm) 4.5"L(11.43cm)



**ESECO** - *Speedmaster*® is a manufacturer of photographic, graphic arts, and X-ray equipment. Our products are made and serviced in the USA and backed by over forty years of technical experience. All ESECO products come with a one year **No Hassle warranty**.

This instrument is accurate to +/- .02 from 0.00 to 4.00 Optical Density. The push button switch "wakes up" the Pocket Pal and gives a stable reading in just 1 second. The *Speedmaster*® **SM-12** also features alignment marks for quick film positioning.

The **SM-12** is constructed to be rugged and durable. Minimal drift and no warm-up time provide fast, dependable readings. A 9V AC adapter is available as an accessory.

Reliability and ease of use make the compact *Speedmaster*® **SM-12 "Pocket Pal"** the ideal cost-effective choice for film processing quality assurance.



## DETEK, Inc

6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
301-449-7300 FAX 301-449-7011  
www.detek.com email: sales@detek.com

☆☆☆  
MADE IN  
USA

All prices in USD subject to change without notice

# ESECO

# ND<sub>on</sub> T<sub>esting</sub> destructive

# Speedmaster®



## Service no other competitor can provide!

- ▶ **ESECO has been in business since 1956**
- ▶ **Personal Service**
- ▶ **Very competitive pricing**
- ▶ **Loaner program available when service is required**
- ▶ **Cost effective re-certification program**

## SM-14 Densitometer

Reads densities directly from film viewers

Measuring Aperture	3mm
Measuring Range	0.00 to 4.00 D
Accuracy	± 0.02 D or 1%
Repeatability	± 0.02 D
Warm-up Time	None
Portable Power Source	(1) 9v Alkaline Battery Included
Weight	5.9oz. (167.2 grams)
Dimensions	2.5"H(6.35cm) 1.5"W(3.81cm) 4.75"L(12.06cm)



**ESECO** - *Speedmaster*® has been designing and manufacturing X-ray, photographic, and graphic arts equipment since 1956. All ESECO products have a one year **No Hassle warranty**. Our products are made and serviced in the USA, backed by forty five years of technical experience.

The *Speedmaster*® **SM-14** is accurate to +/- .02 from 0.00 to 4.00 Optical Density. The push button switch "wakes up" the Pocket Pal to give a stable reading in just 1 second. Simply place film on your viewer, put the SM-14's "EASY READ" probe on the area to be read then push the read button.

The *Speedmaster*® **SM-14** is constructed for rugged and durable use, minimal drift and no warm-up time, providing it with fast dependable readings. Reliability and ease of use make the compact *Speedmaster*® **SM-14 "Pocket Pal"** the ideal cost-effective choice for film quality assurance.



## DETEK, Inc

6805 Coolridge Drive  
Temple Hills, MD 20748-6940  
301-449-7300 FAX 301-449-7011  
www.detek.com email: sales@detek.com



☆☆☆  
MADE IN  
USA

All prices in USD subject to change without notice





# FILM VIEWERS

## NONDESTRUCTIVE TESTING EQUIPMENT

### Film Viewer Model 65-C1 Twin Deluxe



This film illuminator is a high power illuminator that combines a full viewing panel (14" X 17") and a 4" spot viewer in one unit. Variable light intensity, Foot Switch Control, All steel constructed with enamel finish

Detek P/N AVW-651

Adjustable Iris diaphragm to provide film masking P/N AVW-654

4" Magnifier P/N AVW-655

Bulb 300 watt # BAH P/N AVW-004 or 500 watt EBV Bulb P/N AVW-002

Halogen Bulb for spot viewer – 150 Watt EYK Bulb

### High Intensity Stainless Steel Film Viewer



The QME1001 film viewer is manufactured with 304 Stainless Steel and designed to provide the ultimate in high intensity. Illumination is provided by 4 BBA bulbs. Intensity is controlled by a dimmer switch, Foot Switch control, Fan cooled Supplied with 4 viewing masks; 70mm, 3 1/2", 4 1/2 10" & 17" Reading light mounted on front

Detek P/N AVW-871

Bulb 250 watt # BBA (4 required) P/N AVW-001

### 6" High Intensity Illuminator



This super bright illuminator was designed for reading with densities up to 5.0. This viewer is supplied with a set of steel masks and on/off foot switch. Variable brightness control. Light gray baked enamel finish. Optional adjustable iris is available.

Detek P/N AVW-850

Same as above, with adjustable iris Detek P/N AVW-851

### Spectralux Film Viewer



This film viewer uses a white light source which allows easy viewing of radiographs. No need for high intensity spot, masking or darkened viewing areas. Includes illuminator with carrying handle, light dimmer, foot switch, and power cord. Two versions available: Model 18 with 10" x 2.5" viewing area, Model 54 with 14" x 4" viewing

Model 18 Detek P/N AVW-518 Model 54 Detek P/N AVW-554

Replacement Bulb for Spectralux (white), Set of 2, Detek P/N AVW-055

Replacement Bulb for Veralux (green), Set of 2, Detek P/N AVW-054

### Bright Spot Illuminator



This illuminator was designed for quick and economical film viewing. Unit comes with a swivel base, variable intensity foot switch, and wall or desk mounts. Light gray baked enamel finish.

Detek P/N AVW-880

### REMSCO SuperBright Viewer



Six Tungsten-Halogen 150 Watt Projector Bulbs, with pre-focused Dichroic Multi-Facet Reflectors concentrate 900 watts of high temperature light evenly across the entire 14" x 17" viewing surface. Reads densities up to 4.0. Solid state rheostat dimmer control. 120VAC, 8 amps. Includes footswitch, short mask and 70 mm mask. Size 26.5"L x 7.5"W x 15" H, Wt 21.1 Lbs. Model SB-900

Detek P/N AVW-309

Bulbs, 150W Tungsten Halogen (6 required)

P/N AVW-007

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**

**EMAIL: sales@detek.com**



## NONDESTRUCTIVE TESTING EQUIPMENT

LC NDT FV-2009 Plus Portable LED Film Viewer

New! Upgraded Model!

Eco-Friendly Product!



### Upgraded Features:

- **Increased Intensity:** 120,000 Cd/m<sup>2</sup> = 4.1D
- **Stainless Steel Hardware** – More Durable – Resistant to Corrosion
- Higher Uniformity across viewing window
- **Wall-mount-brackets** – standard

### Standard Features (Same as the FV-2009):

- Lower Power Consumption
- **Viewer Window:** 2.5" x 8" (60mm x 200mm)
- **Uniformity:**  $g \geq 0.95$
- **Diffusion Factor:**  $g \geq 0.95$
- Cool Operation
- **Dimmer:** 5% - 100%
- **Power:** 110 – 220 VAC / 50 – 60 Hz Operation
- **Rated Power:** 5W
- **Warranty:** 5 Years Parts, 1 Year Labor
- **Compact Size:** 18" x 5.5" x 2.5" (455mm x 140mm x 65mm)
- **Weight:** 5.5 lbs/ (2.5 kg)

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



## NONDESTRUCTIVE TESTING EQUIPMENT



### Price Includes:

- Foot Switch
- Mask: 1.8" x 6" (45mm x 150mm)
- Carrying Case
- Instruction Manual
- EC Certificate of Conformity
- Warranty Card

### Shipping:

- Weight: 10 lbs. (4.5 kg)
- Dimensions: 21" x 8" x 9" (52.5cm x 20cm x 22.5cm)
- **Warranty: 5 Years Parts, 1 Year Labor**

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



## LC NDT FV-2010 Plus Portable Film Viewer with Electronic Masking



**FV-2010 Plus is designed to meet the needs of Film Examiners requiring a code compliant X-ray Film Viewer:**

- NEW Electronic Light Mask
- Allows viewing of long strip films
- Bright enough to view 4.1 Density Film
- Low heat output
- Low noise – fan speed varies with temperature
- 25 year lifespan for LEDs (approximately 50,000 hours!)
- Low power consumption
- Universal Power Supply

The LEDs used in the FV-2010 Plus have a pure white light, providing a very uniform luminance and have a theoretical life expectancy of 50,000 hours! The LEDs use much less electricity and generate significantly less heat than conventional lamps, making it better for the environment.

The FV-2010 Plus uses a low voltage / constant current power supply specifically designed to extend the life of LEDs. It is supplied with a Dimmer Control that allows you to adjust the intensity from 5% to 100%. A foot switch is also provided.

Instead of multiple hardware masks, the FV-2010 Plus has 6 push button selectable window sizes as shown below (plus one hardware mask to limit the window height to 2.7" (69mm)).



## NONDESTRUCTIVE TESTING EQUIPMENT



### Even Illumination Typical Luminance distribution in Cd/m<sup>2</sup>

128,000	128,000	130,000	128,000
128,000	129,000	130,000	129,000
127,000	128,000	129,000	128,000

### Specifications:

- **Maximum Luminance:**  $\geq 130,000$  Cd/m<sup>2</sup>
- **Uniformity:**  $g > 0.95$
- **Diffusion Factor:**  $g > 0.95$
- **Viewer Window:** 15.8" x 4" / 400 x 100 mm
- **Surface Temperature Rise:**  $\leq 65^{\circ}\text{F} / 18^{\circ}\text{C}$  after 12 hours of continuous maximum luminance
- **Power:** 85 – 264 VAC / 47 – 63 Hz
- **Dimensions:** 23.6" x 3.1" x 6.3" / 600 x 80 x 160 mm
- **Weight:** 8.8 lbs. (4 kg)
- **Warranty:** 5 years parts, 1 year labor

### Kit Contains:

- FV-2010 Plus Viewer
- External Mask: 15.8" x 2.7"
- Foot Switch
- Power Supply
- Power Adaptor & Line
- Instruction Manual
- Guarantee & Report
- Warranty Card

### Shipping:

- Weight: 16 lbs. (7.25 kg)
- Dimensions: 26" x 9" x 11" (66cm x 20cm x 28cm)

**\*WARRANTY: 5 Years Parts, 1 Year Labor\***





## NONDESTRUCTIVE TESTING EQUIPMENT

### LC NDT FV-2014 14" x 17" Industrial LED Film Viewer



The FV-2014 viewer combines the latest electronic technology with a reliable LED driver circuit. The FV-2014 can view film with a density up to 3.8HD and can be operated continuously 24 hours a day.

#### Features:

- 13" x 16.1" Window size (fits 14" x 17" Film)
- Bright enough to view 3.8 Density Film
- Vertical and Horizontal Electronic Masks
- LED switch control system that allows you to switch on or off areas on the viewer window
- Rugged viewer feet that can support the viewer at any angle or wall mount
- New "Screen Grab" film holder for your convenience
- Low heat output
- Low noise – fan speed varies with temperature
- Low power consumption
- Universal Power Supply – use it anywhere



6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011  
EMAIL: [sales@detek.com](mailto:sales@detek.com)



## NONDESTRUCTIVE TESTING EQUIPMENT



**Mounted on the Wall**



**Rugged Stand**

### Specifications:

<b>Max Luminance:</b>	82,800 Cd/m <sup>2</sup>
<b>Uniformity:</b>	$g = 0.95$
<b>Diffusion Factor:</b>	$\sigma = 0.95$
<b>Viewer Window:</b>	13" x 16.1" (335 x 410 mm)
<b>Surface Temperature:</b>	Rise $\leq 68^{\circ}\text{F}$ ( $20^{\circ}\text{C}$ ) After 12 hours continuous maximum luminance
<b>Power:</b>	85 – 264 VAC 47 – 63 Hz. Universal
<b>Dimensions:</b>	20.1" x 16.1" x 2.4" (L x W x H) 51 x 41 x 6 cm
<b>Weight:</b>	3.4 lbs. (7.4 kg.)
<b>Warranty:</b>	5 years parts, 1 year labor

### FV-2014 Kit Includes:

- FV-2014 Film Viewer
- Vertical and Horizontal Electronic Masks
- Foot Switch
- Power Supply
- Power Adapter & Line
- Instruction Manual
- Guarantee
- Inspection Report
- Warranty Card

6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748  
301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011

EMAIL: [sales@detek.com](mailto:sales@detek.com)



## **NONDESTRUCTIVE TESTING EQUIPMENT**

### **X-Ray Illuminator: Model 87-C1**

The Model 87-C1 is a truly portable industrial radiographic film viewer with high intensity output.



#### ***FEATURES :***

- Variable light intensity control
- Fan cooled for prolonged operation
- Convenient carry handle
- 5.25 x 4.75 inch glass view screen
- 300-watt lamp
- Face plate will accept optional iris diaphragm
- Convenient cord wrap for transport and storage ease
- Optional footswitch control

#### ***CONSTRUCTION :***

Completely constructed of electro-galvanized steel and painted with a durable, textured blue polyurethane enamel.

The variable dimmer allows precise control of the light source for positive film interpretation.

#### ***SPECIFICATIONS :***

##### **Dimensions:**

- Width = 6"(15.2 cm)
- Height = 11"(27.9 cm)
- Depth = 11"(27.9 cm)
- Active viewing area = 5.25" x 4.75"(13.3 x 12.1 cm)
- Weight = 10 lbs(4.5 kg)
- Shipping weight = 12 lbs(5.4 kg)

**Power requirements:** 115 VAC, 50-60 Hz.

#### ***ORDERING INFORMATION :***

**DETEK P/N AVW-840.** Model 87-C1 illuminator, complete and ready to operate with lamps, and 8-foot, 3-wire power cord.

#### ***OPTIONS :***

- **Model 65-D4 Iris Diaphragm** 4 inch(10 cm) round adjustable opening for high spot masking.
- **Model 65-FS Foot Switch** with cable and plug.

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



## **NONDESTRUCTIVE TESTING EQUIPMENT**

X-Ray Illuminator: Model 65-C2

### **Specifications**

Dimensions: 14" x 25" x 16"

Shipping Weight: 45 lbs.

### **Optional Accessories:**

Variable Round Iris Diaphragm 65-D4

Slotted Iris Diaphragm 65-D5

Detachable Magnifier 65-M4

**DETEK P/N AVW-652**



**Model 65-C2**

### **Deluxe Dual X-Ray Illuminator**

- Combines a full 14"x17" viewing area and a 4 inch diameter "brite spot."
- Illumination of the viewing area is changed by depressing a footswitch which is included with the basic unit.
- Each viewing area is controlled independently with an electronic dimming control.
- The 14"x17" section will illuminate to a 3.0 density and the brite spot will illuminate to 4.0 density film.
- The 14"x17" section uses two BAH 300 watt bulbs and is cooled by fan.
- The "brite spot" area uses either an 500 watt DXb or 300 watt halogen bulb. This section is cooled by a blower and a sheet of Pyrex™ reflecting glass.
- All steel construction protected by attractive textured blue finish and trimmed with polished chrome strips.
  - A hinged top lid makes it easy to change bulbs.

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



**DETEK, Inc.**  
 6805 Coolridge Drive  
 Temple Hills, MD 20748-6940  
 800-638-0554 FAX 301-449-7011  
 www.detek.com sales@detek.com

## ECONOMY ILLUMINATOR

Although this illuminator has a **budget price** it is made with the same care found in higher priced models. It is constructed of *heavy gauge steel* and comes with an on/off switch, plexiglass viewing panel, four *stainless steel spring action film clips* and a film retainer ledge. The 14"x17" viewing area is illuminated by two F15T8/D daylight fluorescent bulbs.

DEPTH OF VIEWERS: 5.375"		EXTERIOR DIM		APPROX.	CATALOG
VIEWING AREA	WIDTH	HGT	SHIP WT		NO.
SingleBank 14"x17"	15.625"	18.25"	16lbs		200

ALL MEASUREMENTS ARE ± 1/16"



**Finish:** Light Grey baked enamel

**Electrical:** Viewers operate on 120 volt, 60 Hz, .75 Amps AC per viewing area. Supplied with a 6' three conductor line cord. For special voltages consult factory.

## 12" X 24" ILLUMINATORS

Designed to view three 8"x10" or two 10"x12" films at one time, this superior illuminator with built in reflectors and two F20T12/D daylight fluorescent bulbs produces bright even illumination. **Surface** and **Recessed** models are all steel construction with your choice of *Gravity Film Grips* or *Spring Film Clip Holders*.

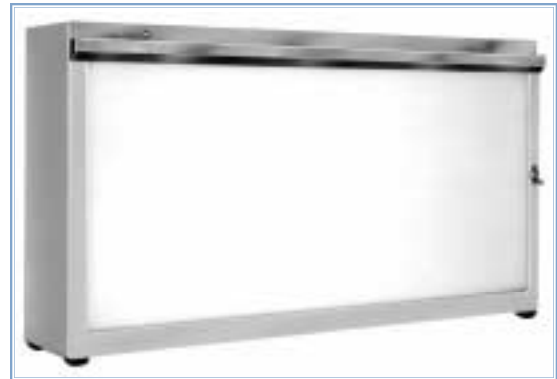
### **SURFACE MOUNTED MODELS**

DEPTH OF VIEWERS: 5.25"		EXTERIOR DIM		APPROX.	CATALOG NO.
VIEWING AREA	WIDTH	HGT	SHIP WT	GRAVITY GRIP	FILM CLIP
SingleBank 12"x24"	24.625"	13.5"	25 lbs	254T	254

### **RECESSED MODELS**

DEPTH OF VIEWERS: 5.25"		EXTERIOR DIM		WALL OPENING		APPROX.	CATALOG NO.
VIEWING AREA	WIDTH	HGT	WIDTH	HGT	SHIP WT	GRAVITY GRIP	FILM CLIP
Single Bank 12"x24"	24.625"	13.5"	24.875"	13.75"	26 lbs	254RT	254R

ALL MEASUREMENTS ARE ± 1/16"



**Finish:** Light Grey baked enamel

**Electrical:** Viewers operate on 120 volt, 60 Hz, .75 Amps AC per viewing area. Supplied with a 6' three conductor line cord. For special voltages consult factory.

**NEED HELP IN SELECTING THE RIGHT ILLUMINATOR FOR YOUR APPLICATION? CALL US AT 800 - 347 - XRAY AND WE'LL BE HAPPY TO ASSIST YOU!**





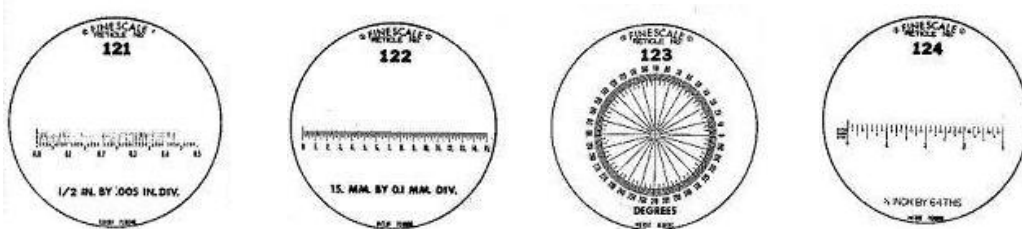
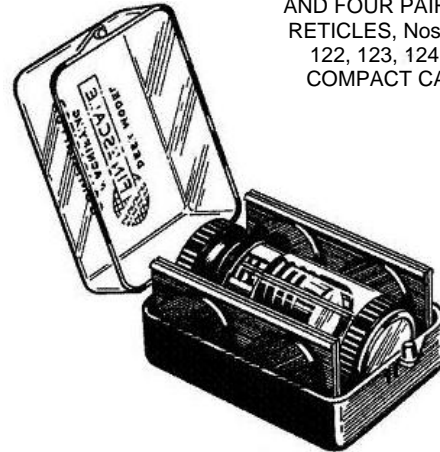
# NONDESTRUCTIVE TESTING EQUIPMENT

## Magnifying Comparators and Reticles

POCKET MODEL COMPARATOR  
NO. 10 - WITH MAGNIFIER, ONE PAIR  
RETICLES No. 121, AND POCKET  
CARRYING CASE



DESK MODEL  
COMPARATOR NO. 20  
- WITH MAGNIFIER  
AND FOUR PAIRS OF  
RETICLES, Nos. 121,  
122, 123, 124, IN  
COMPACT CASE



A precision 6 power magnifier and any one of more than 30 transparent scales called Reticles assembled to make a convenient POCKET INSTRUMENT!

- \* ACCURATE
- \* EASY TO USE. Just place it on the work and read, as you do with any other scale
- \* VERSATILE. Over 30 Reticles for making all types of measurements and comparisons. Once scale to a Reticle.
- \* CONVENIENT. Easily applied to any object large or small. No depth-of-throat limitations.
- \* RUGGED. An unbreakable tool with optical precision.
- \* TRULY PORTABLE. You can really carry it in your pocket – COMFORTABLY.
- \* INEXPENSIVE. Everyone can have his own and all exactly alike.

For greater accuracy when measuring small objects. Actually better for many purposes than measuring microscopes or projection comparators costing A HUNDRED TIMES as much.

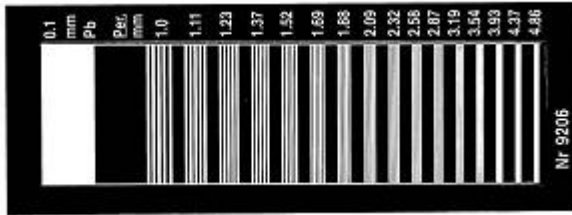
**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



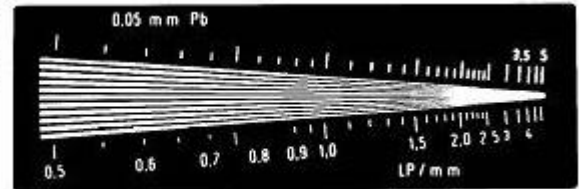
# NONDESTRUCTIVE TESTING EQUIPMENT

## LINE PAIR GUAGES

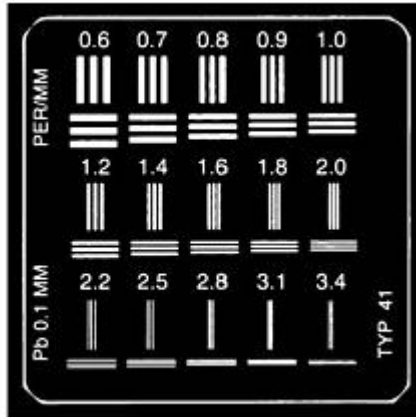
07-501  
07-521  
07-525  
07-547  
07-555



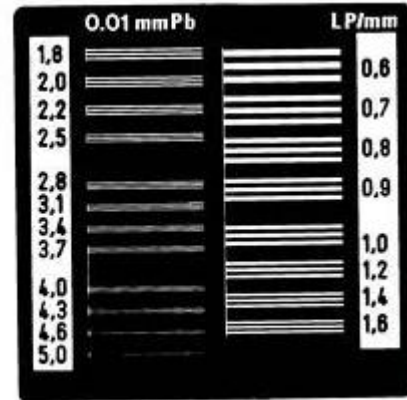
07-515  
07-523  
07-539



07-541  
07-548



07-526  
07-527  
07-535  
07-538



The choice of pattern depends on the specific application. The sector test patterns are 0.4°, and the group test patterns have varying numbers of line pair groups. Lead thicknesses are limited by the resolution, with a maximum thickness of 0.1 mm for test patterns up to 5 LP/mm. Radiopaque numbers indicate the resolution (in LP/mm) of each group.

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**

**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



# NONDESTRUCTIVE TESTING EQUIPMENT

<b>X-Ray Test Patterns for Measuring Resolution</b>			
<b>07-501-2000:</b>	Range of Resolution in LP/mm:	1.0-4.8	
	Number of Groups:	16	
	Lead-foil Thickness in mm:	0.1	
	Dimensions in mm:	110 x 40	
<b>07-501-1000:</b>	Range of Resolution in LP/mm:	1.0-4.8	
	Number of Groups:	16	
	Lead-Foil Thickness in mm:	0.1	
	Dimensions in mm:	110 x 40	
<b>07-521:</b>	Range of Resolution in LP/mm:	2.0-10.0	
	Number of Groups:	15	
	Lead-Foil Thickness in mm:	0.05	
	Dimensions in mm:	94 x 50	
<b>07-525:</b>	Range of Resolution in LP/mm:	3.15-16.6	
	Number of Groups:	15	
	Lead-Foil Thickness in mm:	0.03	
	Dimensions in mm:	94 x 50	
<b>07-555:</b>	Range of Resolution in LP/mm:	5.0-20.0	
	Number of Groups:	13	
	Lead-Foil Thickness in mm:	0.02*	
	Dimensions in mm:	25 x 10	
<b>07-515:</b>	Range of Resolution in LP/mm:	1.0-10.0	
	Number of Groups:	1	
	Lead-Foil Thickness in mm:	0.05	
	Dimensions in mm:	80 x 40	
<b>07-523-2000:</b>	Range of Resolution in LP/mm:	0.5-5.0	
	Number of Groups:	1	
	Lead-Foil Thickness in mm:	0.1	
	Dimensions in mm:	157 x 50	
<b>07-523-1000:</b>	Range of Resolution in LP/mm:	0.5-5.0	
	Number of Groups:	1	
	Lead-Foil Thickness in mm:	0.1	
	Dimensions in mm:	157 x 50	
<b>07-539:</b>	Range of Resolution in LP/mm:	01.5-20.0	
	Number of Groups:	1	
	Lead-Foil Thickness in mm:	0.025	
	Dimensions in mm:	60 x 30	
<b>07-526:</b>	Range of Resolution in LP/mm:	0.6-10.0	
	Number of Groups:	26	
	Lead-Foil thickness in mm:	0.05	
	Dimensions in mm:	65 x 55	
<b>07-527:</b>	Range of Resolution in LP/mm:	0.6-5.0	
	Lead-Foil Thickness in mm:	0.01	
	Number of Groups:	20	
	Dimensions in mm:	50 x 50	
<b>07-535:</b>	Range of Resolution in LP/mm:	0.6-5.0	
	Number of Groups:	20	
	Lead-Foil Thickness in mm:	0.05	
	Dimensions in mm:	50 x 50	
<b>07-538-2000:</b>	Range of Resolution in LP/mm:	0.6-5.0	
	Number of Groups:	20	
	Lead-Foil Thickness in mm:	0.1	
	Dimensions in mm:	50 x 50	
<b>07-538-1000:</b>	Range of Resolution in LP/mm:	0.6-5.0	
	Number of Groups:	20	
	Lead-Foil Thickness in mm:	0.1	
	Dimensions in mm:	50 x 50	
<b>07-541-2000:</b>	Range of Resolution in LP/mm:	0.6-3.4	
	Number of Groups:	2 x 15	
	Lead-Foil Thickness in mm:	0.1	
	Dimensions in mm:	50 x 50	
<b>07-541-1000:</b>	Range of Resolution in LP/mm:	0.6-3.4	
	Number of Groups:	2 x 15	
	Lead-Foil Thickness in mm:	0.1	
	Dimensions in mm:	50 x 50	
<b>07-548:</b>	Range of Resolution in LP/mm:	2.0-6.0	
	Number of Groups:	2 x 14	
	Lead-Foil Thickness in mm:	0.08	
	Dimensions in mm:	50 x 50	

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



# NONDESTRUCTIVE TESTING EQUIPMENT

## X-Ray Test Patterns for Measuring Resolution of Image Intensifiers and Video Systems

<b>07-506:</b>	Range of Resolution in LP/mm:	1.0-2.0	<b>07-529:</b>	Range of Resolution in LP/mm:	2.8-5.0
	Number of Groups:	2 x 6		Number of Groups:	2 x 6
	Lead-Foil Thickness in mm:	0.1		Lead-Foil Thickness in mm:	0.1
	Dimensions in mm:	32		Dimensions in mm:	32
<b>07-507:</b>	Range of Resolution in LP/mm:	3.0-4.0	<b>07-532:</b>	Range of Resolution in LP/mm:	5.0-6.0
	Number of Groups:	2 x 6		Number of Groups:	2 x 6
	Lead-Foil Thickness in mm:	0.1		Lead-Foil Thickness in mm:	0.05
	Dimensions in mm:	32		Dimensions in mm:	32
<b>07-511:</b>	Range of Resolution in LP/mm:	2.0-3.0	<b>07-537:</b>	Range of Resolution in LP/mm:	5.0-7.0
	Number of Groups:	2 x 6		Number of Groups:	2 x 6
	Lead-Foil Thickness in mm:	0.1		Lead-Foil Thickness in mm:	0.05
	Dimensions in mm:	32		Dimensions in mm:	32
<b>07-519:</b>	Range of Resolution in LP/mm:	1.8-3.15			
	Number of Groups:	2 x 6			
	Lead-Foil Thickness in mm:	0.1			
	Dimensions in mm:	32			

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**





## **NONDESTRUCTIVE TESTING EQUIPMENT**

### Model 300 Darkroom Timer

Reliable and accurate. Can be set in minutes for four-color developing and seconds for enlarger control.

Minutes and seconds can easily be read across the room in total darkness, making the 300 ideal for film processing, especially the precise timing required by color processing. The 60-minute time range can be set in minutes for developing and seconds for enlarger control. Two hands permit quick setting by seconds, minutes or combinations of seconds and minutes.

An exclusive dual-cam mechanism provides extreme accuracy for long time intervals: +/- 015% at maximum dial setting. Two separate outlet receptacles control an enlarger or printer and safelight by a combination time/focus switch. Each outlet has a 600 watts rated capacity for operating most film processing equipment. The Model 300 can be used with a relay for heavier loads.

The case is made of durable plastic and measures 7 1/2" x 7 1/2" x 2 1/2". It is exceptionally strong, withstands high impact, resists chemicals and moisture, and is electrically non-conductive. The case has a recessed handle in the back and keyholes for wall mounting.

#### **Model 300 features:**

- Plastic boot over the power switch prevents corrosion from chemicals or water.
- Contemporary, easy-to-read numerals on a large 6 1/2" diameter face. Numerals, dial and hands are luminous.
- Setting knob for fast fingertip control.
- Precision accuracy assured by electric synchronous motor.
- Buzzer automatically signals end of developing period...can be set for desired volume.
- Sturdy polycarbonate/PET case with rubber base pads resists impact, chemicals and moisture.
- Gray, texture, non-slip finish has contemporary look.
- Keyholes in back make wall mounting easy.
- Three-wire grounded cord.



**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



## NONDESTRUCTIVE TESTING EQUIPMENT

### **Rotatrim**

Rotatrim 18" Mastercut Professional Rotary Cutter  
Item# DFC-018



With cut lengths from 12" (305mm) to 54" (1374mm) chromed steel twin guide rails, silent glide action and all-metal cutting head and end frames.

10mm grid, "A" size indicators and two additional metric/inches scale bars.

These smooth running Professional cutters are designed to withstand high volume applications and will handle virtually all flexible materials up to 3.0mm thickness.

Cut Length 18" (457mm) Capacity 0.12" (3mm) Dimensions 15 x 3.7 x 24" (381 x 94 x 610mm) (approx.)  
Weight 13.2 lbs. (6kg) (approx.)

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: [sales@detek.com](mailto:sales@detek.com)**



## LIGHT LOUVERS

Darkroom and fluoroscopic rooms require these louvers to obtain fresh air without light. Louvers are made of steel finished with a non-reflecting black baked enamel. They are 1.375" thick and can be built into a wall or door. Available in four stock sizes.

EXTERIOR DIM			APPROX.	CATALOG
WIDTH	HEIGHT	DEPTH	SHIP WT	NO.
12"	12"	3.75"	13 lbs	965A
12"	18"	3.75"	20 lbs	965B
12"	24"	3.75"	24 lbs	965C
24"	24"	3.75"	45 lbs	965D



## DEVELOPING HANGERS

These durable stainless steel hangers are passivated and electropolished. The upper clips and cross bar springs provide tension to keep the film flat without tearing. The two bottom clips hold the film at the lowest possible position at the bottom of the tank. 14"x36" hangers are designed to have the film looped around the bottom of the hanger and clipped at the top in order to fit a standard 5 gallon tank.

There is a nominal packing charge if ordering less than twelve hangers (mixed sizes acceptable).

FILM SIZE	APPROX. SHIP WT	CATALOG NO.
5" x 7"	2 lbs	805
8" x 10"	2 lbs	808
10" x 12"	2 lbs	810
11" x 14"	2 lbs	811
14" x 17"	2 lbs	814
7" x 17"	2 lbs	815
14" x 36"	5 lbs	836



## HANGER STORAGE RACK 25 HANGER CAPACITY

Each rack holds up to 25 assorted sizes of hangers and is easily mounted on any dark room wall.

**Finish:** Stainless Steel units are polished to a satin finish. Baked Enamel units: light gray .



WIDTH HGT DEPTH  
15.625" 5.5" 10"

170 - Baked Enamel Hanger Storage Rack approx. shipping Wt. - 4 lbs.  
170S - Stainless Steel Hanger Storage Rack approx. shipping Wt. - 4 lbs.

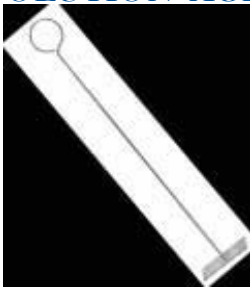
**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**

**EMAIL: sales@detek.com**



## DARKROOM ACCESSORIES

### SOLUTION AGITATORS



All Stainless Steel. Rod is welded to perforated bottom plate for hanging. Electro-polished finished.  
175 - Stainless Steel Solution Agitators approx. ship Wt. -7 lbs.  
**Minimum order of 2**

### DARK ROOM TIMER



For accurate timing of intervals up to 30 minutes. An adjustable stop makes it easy to set repeated time intervals. Operation is simple: setting the timer winds the mechanism, a gong signals the end of the time period. Dial glows in the dark for easy reading.

839A - Darkroom Timer approx. shipping Wt. -3 lbs.

## THERMOMETERS

### DIAL THERMOMETERS



Constructed entirely of Stainless Steel. Easy reading 1.75" diameter dial. Stem is 6" long and .125" in diameter. Thermometer can be hooked onto the insert or ordered with a plastic float.

- 837 - Dial Thermometer
- 837C - Dial Thermometer with Float

### FLOATING GLASS THERMOMETER

A sensitive X-Ray Thermometer enclosed in a glass case, weighted so that the thermometer floats upright. Easy to read scale marked at 68° F. Eye at top allows thermometer to be hung.

838- Floating Glass Thermometer

Minimum order of 6



### DIGITAL WATERPROOF THERMOMETER



With a rubberized keypad and an ABS plastic housing, this thermometer will do the job, rain or shine. Thermometer has min./max. memory. Comes with an immersion probe and a carrying strap. Operates on three AA batteries (included).

- Temperature Range:  
-58° to +302° F/-50° to +150° C
- Resolution: 0.2° F/0.2° C
- Accuracy: ±0.8° F/±0.4° C



# QUICKDRY - FILM DRYERS



- 12 FILM CAPACITY
- THERMOSTATICALLY CONTROLLED
- STAINLESS STEEL or BAKED ENAMEL
- AVAILABLE WITH AUTOMATIC TIMER
- CHOICE OF LEFT HAND DOOR or RIGHT HAND DOOR  
or SPLIT DOUBLE DOORS

The QUICKDRY Dryer can be placed on the floor or on a table. It will economically deliver clean, warm air for fast drying and is thermostatically controlled to prevent dangerous overheating. The air recirculating system keeps heat inside the dryer and speeds drying in any weather. A heavy duty timer (120T) is also available.

The cabinet is cold rolled steel with a baked enamel finish or polished Stainless Steel. The hanger rack is constructed of heavy Stainless Steel and will hold twelve 14"x17" hangers. The bottom is covered by a removable Drip Tray. Doors are reinforced and available in your choice of right hand opening, left hand opening, or split double doors. Right hand units have hinges located on the right side of the door and the door opens from left to right. Left hand units have hinges on the left side of the door and open from right to left.

ALL DRYERS OPERATE ON 118volts 60HZ-AC 6 AMPS. Other voltages available on special order.

Finish: Stainless Steel units are polished to a satin finish. Baked Enamel units: light gray .

\* **Optional Items:** 120T: Built in Heavy Duty Timer

Shown: 119 Right Hand Door

WIDTH	HGT	DEPTH
23"	33.5"	17.75"

approx. shipping Wt. - 67 lbs.

### BAKED ENAMEL FINISH

DESCRIPTION	CATALOG NO
Right Hand	119
Left Hand	119L
Double Door	119D

### STAINLESS STEEL FINISH

DESCRIPTION	CATALOG NO
Right Hand	119S
Left Hand	119LS
Double Door	119DS

## FILM DRYING RACKS

### FOLDING DRYING RACK

- 12 HANGER CAPACITY
- FOLD AWAY TRAY
- EASY WALL MOUNTING

The Folding Drying Rack, constructed entirely of polished Stainless Steel, holds twelve 14"x17" hangers. A solid Stainless Steel back protects the wall at all times and the 20" x 17" tray can be folded up against the back for extra convenience when not in use. It can be mounted quickly and easily in any location. The rack is 23" high, 20" wide and 17" deep with the tray in the open position.



174A - Folding Drying Rack approx. shipping Wt. - 13 lbs.

WIDTH	HGT	DEPTH
20"	23"	17"

### WALL DRYING RACK

A drying rack of polished Stainless Steel. Holds 12 developing hangers at an angle for quick drainage. Holes provided for easy wall mounting.



172 - Wall Drying Rack approx. shipping Wt. - 2 lbs.

WIDTH	HGT	DEPTH
19.75"	2"	2"

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: sales@detek.com**





## FILM DRYERS

- THERMOSTATICALLY CONTROLLED
- 12 or 15 FILM CAPACITY
- STAINLESS STEEL or BAKED ENAMEL
- AVAILABLE WITH FORMICA TOPS
- AVAILABLE WITH AUTOMATIC TIMER
- HIGH EFFICIENCY

This is the small dryer with large dryer features. Scientific air circulation design creates fast drying at high efficiency. Cabinets of polished Stainless Steel or cold rolled steel are available both in twelve and fifteen film capacities.

Film hangers fit into specially slotted holders that keep them separated and vertical at all times. All interior parts are made of Stainless Steel. The drawer opens its full width on ball bearing extension slides. The Stainless Steel drip pan moves with the drawer and is always under the wet film.

The drying system includes a heavy duty motor and fan plus a thermostatically controlled 750 watt sealed heating unit separately controlled but interlocked so that the heater will not function without the fan. A heavy duty timer (**120T**) is also available. The air system recirculates the same heated air many times, thereby obtaining additional drying without additional heat and reducing the heat exhausted into the darkroom, so that normal ventilation is usually sufficient without additional ducts. A pre-set thermostat prevents overheating.

Cabinets are constructed of heavy gauge material welded together for strength.

**ALL DRYERS OPERATE ON 118 volts 60HZ AC 6 AMPS.** Other voltages available on special order.

With or without optional base these dryers can be matched with other 15" cabinets (see page G-9).

**Finish:** Stainless Steel units are polished to a satin finish. Baked Enamel units: Standard finish - light gray baked enamel. Optional Formica Tops are white.

**\* Optional Items:**

**Base:** Designed to raise the dryer 3.5" to provide toe kick space and match 15" Darkroom Cabinets with bases.

**Top:** Formica Dryer Tops are .75" thick and provide a non-marring work surface.

**120T:** Built in Heavy Duty Timer



**12 Film Dryer**  
 WIDTH HGT DEPTH  
 22.5" 33" 15"  
 With Base 36.5" High



**15 Film Dryer**  
 WIDTH HGT DEPTH  
 22.5" 33" 24"  
 With Base 36.5" High

**FILM DRYER - STAINLESS STEEL FINISH**

DESCRIPTION	APPROX. SHIP WT	CATALOG NO
<b>12 FILM DRYER</b>		
Dryer	73 lbs	120S
Dryer W/ Base	85 lbs	120SB
Dryer W/ Top	80 lbs	121AS
Dryer W/ Top & Base	92 lbs	121ASB
<b>15 FILM DRYER</b>		
Dryer	100 lbs	150S
Dryer W/ Base	115 lbs	150SB
Dryer W/ Top	110 lbs	151S
Dryer W/ Top & Base	125 lbs	151SB

**FILM DRYER - BAKED ENAMEL FINISH**

DESCRIPTION	APPROX. SHIP WT	CATALOG NO
<b>12 FILM DRYER</b>		
Dryer	73 lbs	120
Dryer W/ Base	73 lbs	120B
Dryer W/ Top	80 lbs	121A
Dryer W/ Top & Base	92 lbs	121AB
<b>15 FILM DRYER</b>		
Dryer	100 lbs	150
Dryer W/ Base	115 lbs	150B
Dryer W/ Top	110 lbs	151A
Dryer W/ Top & Base	125 lbs	151B

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**  
**EMAIL: sales@detek.com**



# VERTIFILES

- ALL STEEL WELDED REINFORCED CONSTRUCTION
- ADJUSTABLE PARTITIONS
- STACKABLE
- SLIDING DOOR CLOSURE
- AVAILABLE WITH LOCKS

Vertifile cabinets are constructed of heavy gauge cold rolled steel. Each shelf section is reinforced. The inner and outer walls of the sides are welded together for additional strength. The specially designed inner wall eliminates the possibility of a film corner trap. Doors slide smoothly in steel tracks.

Three heavy duty partitions are provided for each shelf. Partitions can be installed in any of eleven positions on each shelf without the need for tools. Choose from 1, 2, 3 or 5 shelf models designed for storing 14"x17" film. Locking doors are also available.

Inside dimensions of each shelf: 18<sup>3</sup>/<sub>8</sub>" deep and 15<sup>3</sup>/<sub>8</sub>" high.

**Finish:** Light gray baked enamel (on cold rolled steel).

**\* Optional Items:**

- 856 - Additional partitions - approx. ship wt. 4 lbs
- 857 - 5" floor base - approx. ship wt. 15 lbs
- 861 - Index guides (see page E - 6) - approx. ship wt. 5 lbs



855 Five shelf Vertifile with doors



853 Three shelf Vertifile with doors



852 Two shelf Vertifile with doors



851 One shelf Vertifile with doors

**VERTIFILES**

DEPTH : 19.75" NO. OF SHELVES	CAT NO WITH DOORS	APPROX SHIP WT	CAT NO WITHOUT DOORS	APPROX SHIP WT	CAT NO W/LOCKS & DOORS	APPROX SHIP WT	EXTERIOR DIM	
							WIDTH	HEIGHT
1	851	60 lbs	851D	54 lbs	851L	60 lbs	29"	17.25"
2	852	110 lbs	852D	98 lbs	852L	110 lbs	29"	33.5"
3	853	163 lbs	853D	147 lbs	853L	163 lbs	29"	49.75"
5	855	285 lbs	855D	240 lbs	855L	285 lbs	29"	82.25"

**6805 COOLRIDGE DR ■ TEMPLE HILLS MD 20748**  
**301-449-7300 ■ 800-638-0554 ■ FAX 301-449-7011**

**EMAIL: sales@detek.com**