Ludlum
Medical Physics

RADIATION SAFETY & IMAGING QUALITY ASSURANCE

PRODUCT CATALOG 2015

About The Company

Ludlum Medical Physics was created to more fully serve the Medical Physics community with products and services focusing on radiation detection instrumentation, along with an accompanying line of test tools, phantoms and shielding for diagnostic and nuclear medicine quality assurance.

This catalog presents a whole range of products all from one company whose roots are legendary for high quality, affordable pricing, long service life and superior after-market support. Ludlum is committed to upholding these same values which have made it so successful for more than five decades.

www.medphys.ludlums.com

Visit our website to see our complete line of products and view the latest news.

Technical Support

Sig Ditzig is the Medical Business Development Manager for Ludlum Medical Physics. He brings a wealth of experience and knowledge of this market. Sig is available to answer any technical questions and to assist in selecting products best suited to your needs. You can reach Sig by telephone at 330-952-1022 or via email: sjditzig@ludlums.com.

RADIATION SAFETY

NUCLEAR MEDICINE QUALITY ASSURANCE

DIAGNOSTIC QUALITY ASSURANCE

Dependable Solutions at Affordable Prices

Table of Contents

Model 26 Integrated Pancake Frisker

Introduction

Frisking people and objects for alpha and beta contamination has always been a little awkward because manipulation of the cable, detector, and electronics required the use of both hands. The cable-less Ludlum Model 26 consolidates the electronics and the detector into one ergonomic housing. This optimized configuration incorporates a standard 15.51 cm² GM pancake probe, loud audio "click" output, and large auto-ranging LCD display with automatic back lighting into one convenient package, making it easier than ever to detect contamination.

Operation is kept extremely simple through the use of just two buttons. A useful feature employed in the design is the MAX mode, which captures the highest or peak count rate. It is particularly convenient whenever the display is not directly visible. The scaler mode, with a preset count time, allows the user to take a discrete measurement. This system also incorporates low power circuitry, delivering hundreds of hours of use with just two standard "AA" size batteries. The calibrator can protect parameters (cps/cpm, response time, alarm points, and scaler time) or allow the user to adjust them.

Part Number: 48-3885

Specifications

DETECTOR: pancake GM (Geiger-Mueller) detector, stainless steel screen (79% open)

WINDOW AREA: Active: 15.51 cm² (2.4 in²); Open: 12.26 cm² (1.9 in²)

EFFICIENCY (4π) (surface plane):

Alpha: 11% for ^{239}Pu

Beta: 18% for ^{99}Tc; 32% for ^{32}P; 2% for ^{14}C; 22% for ^{90}Sr/^{90}Y; 0.2% for ^{125}I

Gamma: 3300 cpm/mR/hr or 5.5 cps/μSv/hr (^{137}Cs); $\leq$ 1% for ^{99m}Tc

RESOLVING TIME: approximately 100 microseconds as defined by IEC 60325

ALARMS: count rate and scaler alarm setpoints adjustable over the display range

OVERLOAD: high count rate saturation protection prevents false display of lower count rates

LCD DISPLAY: 3½ digit LCD with large 12.7 mm (0.5 in.) digits, cpm, cps, low-battery indicator

RANGE: 0.1 cps to 1.99 kcps, or 1 cpm to 99.9 kcpm

BACKLIGHT: built-in ambient light sensor automatically activates low-power LED backlight, or may be configured for 'Continuous On' operations (will reduce battery life)

CONTROLS: two pushbuttons

OFF/ON/QUIET: press to turn ON, tap to alternate between click audio and QUIET, hold for OFF

MODE: alternates between Normal (count rate) and Max (captures peak rate), and Scaler (user-selectable preset count time from 0 to 20 minutes). Each mode is separately programmable so it can be active or turned off.

RESPONSE TIME: user-selectable from 1 to 60 seconds, or automatic FAST or SLOW

CLICK AUDIO: greater than 60 dB at 0.6 m (2 ft)

POWER: two "AA" batteries

BATTERY LIFE: approximately 1000 hours of operations (as low as 500 hours with backlight configured for 'Continuous On'), 16-hour low-battery warning

CONSTRUCTION: high-impact plastic with separate battery compartment, wrist cuff and lanyard included

ENVIRONMENTAL RATING: NEMA 3/ IP 53

TEMPERATURE RANGE: -20 to 50 °C (-4 to 122 °F), may be certified for operation from -40 to 65 °C (-40 to 150 °F)

SURFACE EMISSIONS RATE: $\leq$ 15%

DISTANCE FROM SURFACE PLANE TO GRILL: 0.32 cm (one-eighth inch)

SIZE: 4.6 x 6.9 x 27.2 cm (1.8 x 2.7 x 10.7 in.) (H x W x L)

WEIGHT: 0.45 kg (1.0 lb

Specialized Survey Meters

Model 26-1 Integrated Pancake Frisker

Introduction

Optimized configuration of Model 26-Series includes a standard 15 cm² GM pancake, loud audible "click" output, and large auto-ranging LCD display with automatic backlighting. Model 26-1 has the addition of a Units button that can display measurements in terms of mR/hr, µSv/h, dpm, or Bq. These features are combined in one convenient package making it easier than ever to detect alpha/beta contamination and measure gamma fields on personnel and objects.

Operation of the Model 26-1 is kept simple through the use of just three buttons that are strategically placed for one-handed operation. Three modes of operation, RATE, MAX, and COUNT, are available. The user-selected units can display results in a measurement of scaler counts, activity (disintegrations), time-averaged rates, or even accumulated dose. In addition, the optionally-available energy-compensation filters can correct the energy response for exposure or ambient equivalent dose. See Model L-4002-1066 Exposure Filter Kit and Model L 2002-1050 Ambient Dose Equivalent Filter Kit.

Low-power circuitry means two standard "AA" sized batteries deliver hundreds of hours of instrument operation. Other features include a backlight triggered by low-level ambient lighting (may be configured for "Continuous On" operation) and a click' audio that may be silenced for both RATE and MAX modes.

Part Number: 48-3965

Specifications

DETECTOR: pancake GM (Geiger-Mueller) detector, stainless steel screen (79% open)
WINDOW AREA: Active: 15.51 cm² (2.4 in²); Open: 12.26 cm² (1.9 in²)
EFFICIENCY (4π) (surface plane):
    Alpha: 11% for ^{239}Pu;
    Beta: 18% for ^{99}Tc; 32% for ^{32}P; 2% for ^{14}C; 22% for ^{90}Sr/^{90}Y; 0.2% for ^{125}I;
    Gamma: 3300 cpm/mR/hr or 5.5 cps/µSv/h (^{137}Cs); ≤1% for ^{99m}Tc
RESOLVING TIME: approximately 110 microseconds as defined by IEC 60325
ALARMS: count rate and scaler alarm setpoints adjustable over the display range
OVERLOAD: high count rate saturation protection prevents false display of lower count rates
ZERO PROTECTION: after 60 seconds of no pulses from detector, unit will flash a zero reading and the alarm audio will be triggered
LCD DISPLAY: 3½ digit LCD with large 12.7 mm (0.5 in.) digits, (k)cps, (k)cpm, (k)dpm, (k)Bq, mR/hr, µSv/h, Bq, and dpm; low-battery indicator, MAX, ALARM
RANGE: 0.1 cps to 19.9 kcps, or 1 cpm to 999 kcpm, 0.0 to 500 mR/hr, 0.01 to 1999 µSv/h; 0.1 to 19.9 kBq; 1 to 999 kcpm
BACKLIGHT: built-in ambient light sensor automatically activates low-power LED backlight, or may be configured for 'Continuous On' operations (will reduce battery life)
CONTROLS: three pushbuttons
    ON/OFF/QUIET: press to turn ON, tap to alternate between 'click' audio and QUIET, hold for OFF
    MODE: alternates between NORMAL (count rate) and MAX (captures peak rate), and COUNT (user-selectable preset count time from 0 to 20 minutes)
    UNITS: changes units from count rate (cpm, cps) to dose/exposure (µSv/h, mR/hr) to activity (dpm/Bq)
RESPONSE TIME: user-selectable from 1 to 60 seconds, or Auto-Response Rate FAST or SLOW
CLICK AUDIO: greater than 60 dB at 0.6 m (2 ft)
POWER: two "AA" alkaline batteries
BATTERY LIFE: approximately 1000 hours of operations (as low as 500 hours with backlight configured for 'Continuous On'), 16-hour low-battery warning
CONSTRUCTION: high-impact plastic with water-resistant rubber seals and separate battery compartment
ENVIRONMENTAL RATING: NEMA 3/IP 53
TEMPERATURE RANGE: -20 to 50 °C (-4 to 122 °F), may be certified for operation from -40 to 65 °C (-40 to 150 °F)
DISTANCE FROM SURFACE PLANE TO SCREEN: 0.32 cm (0.125 inch)
SIZE: 4.6 x 6.9 x 27.2 cm (1.8 x 2.7 x 10.7 in.) (H x W x L)
WEIGHT: 0.45 kg (1.0 lb)

Specialized Survey Meters

Model 12-4
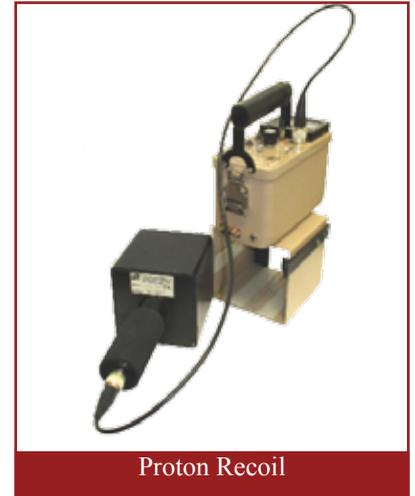

9 in. REM Ball

• Analog Meter
• Weight: 8 kg (17.6 lb)

Model 2241-4

9 in. REM Ball

• Digital Ratemeter/Scaler
• Programmable Alarms
• RS-232 Output
• Weight: 6.6 kg (14.5 lb)

Model 2363 w/42-41L

Proton Recoil

• Analog/Digital Ratemeter/Scaler
• Includes Internal Energy
  Compensated GM Detector
• Adjustable Alarms
• Weight: 1.6 kg (3.5 lb)

| Model	Detector Range	Sensitivity	Gamma Rejection	Neutron Energy Response	Part Number
12-4	0–100 mSv/h (0–10,000 mrem/hr)	10,000 cpm/ mSv/h (100 cpm/mrem/ hr)	< 10 cpm through 0.1 Sv/h (10 R/hr)	provides appropriate inverse RPG curve for neutrons from thermal through 7 MeV, provides response up to 12 MeV	48-1200
2241-4	0–100 mSv/h (0–10,000 mrem/hr)	10,000 cpm/Sv/h (100 cpm/mrem/ hr)	< 10 cpm through 0.1 Sv/h (10 R/hr)	provides appropriate inverse RPG curve for neutrons from thermal through 7 MeV, provides response up to 12 MeV	48-2973
2363 with 42-41L	Neutron: 0.1 mrem/hr–1 rem/hr Gamma: 0.1 mR/hr–1 R/hr	Neutron: 350 cpm/mrem/hr Gamma: 1000 cpm/mR/hr	≈ 400 cpm @ 100 mR/hr (^{137}Cs)	thermal to 100 MeV	48-3514

Specialized Survey Meters

Model 702i

Part Number: 48-3800

Isotope Identifier

- Quick Identification with High Accuracy
- 5.1 x 3.8 cm (2 x 1.5 in.) Internal NaI Detector
- Self Calibrating
- Sunlight Readable Color LCD
- Separate User & Advanced Operational Modes
- Single-Handed Operation
- ANSI N42-34 Compliant
- Removable Compact Flash Card Spectra Storage
-

Model 732

Part Number: 48-3834

Isotope Identifier
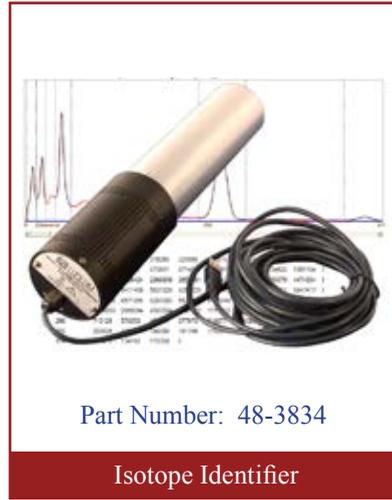
- 1K Multi Channel Analyzer
- 5.1 x 5.1 cm (2 X 2 in.) NaI(Tl) Detector
- USB PC Interface
- Includes PC Spectrum Acquisition & Analysis Software
- PC not included

Model 733

Part Number: 48-3835

Isotope Identifier
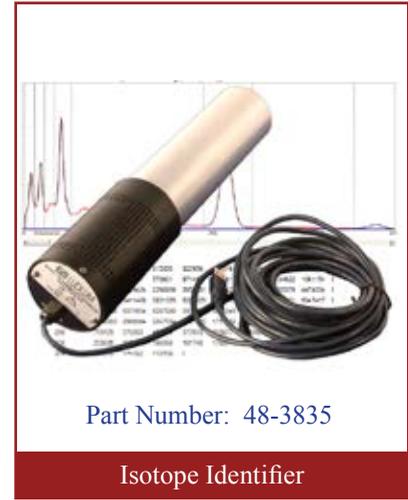
- 1K Multi Channel Analyzer
- 7.6 x 7.6 cm (3 X 3 in.) NaI(Tl) Detector
- USB PC Interface
- Includes PC Spectrum Acquisition & Analysis Software
- PC not included

Model 703e

Part Number: 48-4075

Isotope Identifier

- Identifies Mixed Isotopes in One Second
- NaI(Tl), externally housed, 7.6 x 7.6 cm (3 x 3 in.) (D x L)
- automatic calibration
- 320 x 240 high brightness LCD display
- can be password-protected for use by non-technical personnel
- 3.4 kg (7.4 lb) with batteries

Model 711i

Part Number: 48-3967

Isotope Identifier

- Identifies Mixed Isotopes in One Second
- LaBr, internally housed, 3.8 x 3.8 cm (1.5 x 1.5 in.) (D x L) Detector
- USB PC Interface
- automatic calibration (temperature) stabilization with low-level 40K source

Model 711e

Part Number: 48-4098

Isotope Identifier

- Identifies Mixed Isotopes in One Second
- Provides Total Dose Rate & Dose Rate by
- Isotope Instantly
- Externally Housed NaI Detector
- Ethernet Connectivity for Remote Operation

Survey Meters (Ion Chambers)

Model 9DP Pressurized Ionization Chamber Survey Meter

Introduction

The all-digital, Ludlum Model 9DP, pressurized ion chamber meter will provide highly sensitive measurements of exposure and exposure rate. The meter is light in weight yet rugged, and can be used for medical, laboratory and industrial applications. The new meter offers auto-zeroing and auto-ranging features, as well as an integrate mode and peak holding to capture the highest reading since the instrument was turned on. Other key features include a stunning full color, sunlight readable display, audio output, data logging with time stamp, USB PC interface, programmable user messages, free firmware updates via internet, rechargeable batteries, dose clearing, multi-lingual support and more.

The Model 9DP can be used for a variety of medical and health physics applications and is ideal for measuring exposure rates from leakage and scatter radiation around diagnostic and therapeutic x-ray rooms. The unit is shipped calibrated and ready for use upon arrival at the customer's site.

Part Number: 48-3742

Specifications

RADIATION DETECTED: Gamma & X-rays above 25 keV; beta above 1 MeV

OPERATING RANGES: With R/hr units: 0–500 µR/hr, 0–5 mR/hr, 0–50 mR/hr, 0–500 mR /hr, 0–5 R/hr

With Sv/h units: 0–5 µSv/h, 0–50 µSv/h, 0–500 µSv/h, 0–5 mSv/h, 0–50 mSv/h

CHAMBER VOLUME: 230 cc (14 in.²) pressurized to 125 psi

ACCURACY: +/- 10%

RESPONSE TIME: 5 seconds in lowest range, 2 seconds in all other ranges, when measuring from 10% to 90% of final value

MEASUREMENT READOUTS: Simultaneous display of rate, integrated reading, and highest rate (peak hold)

DATA LOGGING: Data is stored to detachable USB thumb drive in CSV format for easy retrieval by PC spreadsheet/database programs. Data points include real-time clock generated date and time with rate, integrated reading, and instrument status. Logging time intervals are set by PC interface program or standard USB keyboard (with no additional USB ports and no integrated mouse or trackpad, such as LMI part #2312289).

LCD DISPLAY: 8.9 cm (3.5 in.) diagonal, 240 x 320 (H x W) pixels, TFT active matrix, 262,000 colors, 220 cd/m²

USER CONTROLS: 4 pushbuttons: on/off, peak rate/integrate mode, audio on/off, alarm acknowledge/meter reset/clearing integrated dose or peak rate

AUTOMATIC FUNCTIONS: Auto Ranging, Auto Zeroing, Auto LCD Backlighting

AUDIO OUTPUTS: Built-in unimorph speaker, > 60 dB at 0.6 m (2 ft.), optional audio jack for (PN 4293-891) connection to optional external headset

ALARMS: Two levels of radiation alarms available, each are user programmable throughout entire readout range and set through a PC interface program. Other alarms include low battery and various detector failures

TEMPERATURE RANGE: -20 to 40 °C (-4 to 104 °F)

POWER: Eight rechargeable AA NiMH batteries, supplied with wall charger

BATTERY LIFE: ~12 to 30 hours between charges, depending upon use of backlighting

PC INTERFACE: USB, requires special cable and PC program sold separately

CONSTRUCTION: Durable molded plastic with internal metal support

SIZE: 21.9 x 11.6 x 24.5 cm (8.6 x 4.6 x 9.6 in.) (H x W x L)

WEIGHT: 1.5 kg (3.3 lb), including batteries

Options

Dimension Interface Package, PN: 4293-763
Carrying Case, PN: 2310330
Stereo Headset, PN: 47-3708
10 µCi, [137]Cs Check Source, PN: 01-5231

Model 9DP Exposure Energy Response Relative to Cs-137
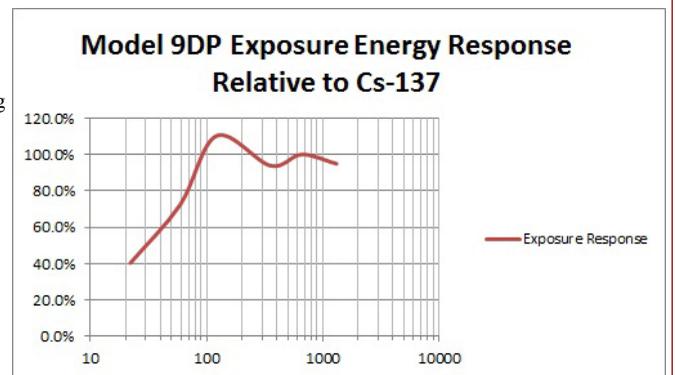
Survey Meters (Ion Chambers)

Model 9DP-1 Pressurized Ionization Chamber Survey Meter

Introduction

The Ludlum Model 9DP-1 ion chamber meter is specially designed for radiography work where pulsed fields are being measured. This instrument correctly integrates 50 nanosecond pulses (and wider) that other systems typically miss or measure inaccurately. This instrument measures both exposure and exposure rate and can simultaneously display the exposure rate with either the integrated value or highest rate seen by the instrument. The integrated value can be reset (if desired) using one of the four convenient front-panel mounted buttons. The buttons also control instrument power, function selection, setting the speaker volume, and acknowledging alarms.

The detector chamber is only pressurized to 1.7 atmospheres (20 psi), thus avoiding all (USA) HAZMAT concerns for shipping and handling. The stunning 256-color, bit-mapped display provides an optimized presentation of the data and is accompanied with icons informing the user of the active functions and instrument status. Alarms are manifested using color changes on the display and an acknowledgeable audio output. Measurements can be logged to an industry standard, USB thumb drive plugged into the instrument USB port. Data are written in CSV format for convenient retrieval by a PC spreadsheet or database program.

Part Number: 48-3899

Specifications

RADIATION DETECTED: gamma & X-rays above 25 keV; beta above 1 MeV, correctly integrates pulsed fields with 50 nanosecond pulse widths

OPERATING RANGES: With R/h units: 0–5 mR/h, 0–50 mR/h, 0–500 mR /h, 0–5 R/h, 0–50 R/h; With Sv/h units: 0–500 μSv/h, 0–5 mSv/h, 0–50 mSv/h, 0–500 mSv/h

CHAMBER VOLUME: 220 cc volume pressurized to 1.36 atmospheres (20 psi)

ACCURACY: +/-10%

RESPONSE TIME: 5 seconds in lowest range, 2 seconds in all other ranges, when measuring from 10% to 90% of final value

MEASUREMENT READOUTS: simultaneous display of rate and either the integrated reading or highest rate (peak hold)

INCLUDED FUNCTIONS: integrated reading, peak reading, range lock (0–50 R/h) for reading pulsed fields

DATA LOGGING: Data is stored to detachable USB thumb drive in CSV format for easy retrieval by PC spreadsheet/database programs. Data points include real-time clock generated date and time with rate, integrated reading, and instrument status. Logging time intervals are set by PC interface program or standard USB keyboard (with no additional USB ports, and no integrated mouse or trackpad, such as LMI part 2312289).

LCD DISPLAY: 8.9 cm (3.5 in.) diagonal, 240 H x 320 W pixels, TFT active matrix, 262,000 colors, 220 cd/m²

USER CONTROLS: 4 pushbuttons: on/off, peak rate/integrate mode, audio on/off, alarm acknowledge/meter reset/clearing integrated dose or peak rate

AUTOMATIC FUNCTIONS: auto ranging, auto zeroing, auto LCD backlighting

AUDIO OUTPUTS: built-in unimorph speaker, > 60 dB at 0.6 meters (2 ft.) An optional audio jack can be installed for connecting to an external headset (not supplied).

ALARMS: two levels of radiation alarms available, each are user programmable throughout entire readout range and set through a PC interface program. Other alarms include low battery and various detector failures.

TEMPERATURE RANGE: -20 to 40 °C (-4 to 104 °F)

POWER: eight rechargeable "AA" NiMH batteries, supplied with wall charger for direct connection to instrument

BATTERY LIFE: 12 to 30 hours between charges, depending upon use of backlighting

USB INTERFACE: single USB port, may be connected directly to a USB keyboard (with no additional USB ports, and no integrated mouse or trackpad) to facilitate password-protected parameter changes, accepts USB thumbdrive for storing logged data, optional interface kit facilitates connection to a PC for parameter editing and calibration

CONSTRUCTION: durable molded plastic with internal metal support

SIZE: 21.9 x 11.6 x 24.5 cm (8.6 x 4.6 x 9.6 in.) (H x W x L)

WEIGHT: 1.5 kg (3.3 lb), including batteries
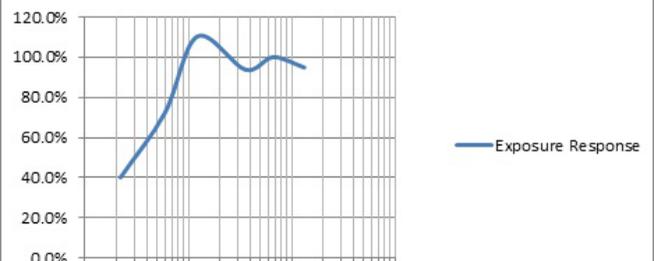
Survey Meters (Ion Chambers)

## Model 9DP* Pressurized Ionization Chamber Survey Meter

Part Number: 48-3942

Introduction

The ambient dose version of the Model 9DP, designated as Model 9DP*, is a highly sensitive pressurized ion chamber meter that provides a measurement of exposure and exposure rate that is measured and displayed in accordance with, and based on, the ICRU (International Commission on Radiation Units) 30 cm tissue equivalent sphere. Simply described, the definition of ambient dose equivalent is the dose equivalent readout that would be measured at a (human) tissue depth of 10 mm. This requires a special ion chamber that can provide a conversion of the (air kerma) exposure rate to provide the ambient dose and dose rate. Just like the Model 9DP, the Model 9DP* can simultaneously display the *rate, integrated value, and highest *rate seen by the instrument. The integrated value can be reset (if desired) using one of the four convenient front panel mounted buttons.

The stunning 256K color, bit-mapped display provides an optimized presentation of the data, and it is accompanied with icons informing the user of the active functions and instrument status. All logged data can be written in CSV format to a plugged-in industry standard USB thumb drive for convenient retrieval by a PC spreadsheet or database program. Alarms are manifested using color changes on the display and an acknowledgeable audio output.

Model 9DP* Ambient Dose Equivalent Energy Response Relative to Cs-137

Specifications

RADIATION DETECTED: beta above 1 MeV; gamma & X-rays above 25 keV

CHAMBER VOLUME: 230 cc volume pressurized to 8 atmospheres (117 psi)

ACCURACY: +/- 10%

OPERATING RANGES: with Sv/h units: 0–5 μSv/h, 0–50 μSv/h, 0–500 μSv/h, 0–5 mSv/h, 0–50 mSv/h; with R/hr units: 0–500 μR/hr, 0–5 mR/hr, 0–50 mR/hr, 0–500 mR /hr, 0–5 R/hr

RESPONSE TIME: from five seconds in lowest range to under two seconds in highest range when measuring from 10% to 90% of final value

GEOTROPISM: < 1%

MEASUREMENT READOUTS: simultaneous display of rate and either the integrated value or highest rate (peak)

MINIMUM READOUT: 0.01 μSv/h, 0.1 μR/hr

LCD DISPLAY: 8.9 cm (3.5 in.) diagonal, 240 H x 320 W pixels, TFT active matrix, 262,144 colors, 220 cd/m²

USER CONTROLS: 4 push buttons: Instrument on/off, Function (for peak rate/integrate modes), Audio on/off, and Asterisk (for alarm acknowledge/meter reset/clearing integrated dose or peak rate)

AUTOMATIC FUNCTIONS: auto ranging, auto zeroing, auto LCD backlighting

DATA LOGGING: Stored to detachable USB thumb drive in csv format for easy retrieval by PC spreadsheet/database programs. Data points include date and time with dose rate, integrated dose, and instrument status. Logging time intervals are set by PC interface program.

AUDIO OUTPUTS: built-in unimorph speaker > 60 dB at 0.6 m (2 ft), optional audio jack available for connection to external (optional) headset

ALARMS: Two levels of radiation alarms available, each is user programmable throughout the entire readout range.

USB INTERFACE: single USB port, connects directly to a USB keyboard (with no additional USB ports and no integrated mouse or trackpad) to facilitate password-protected parameter changes, accepts USB thumbdrive for storing logged data, or to an optional Dimension Interface Package (# 4293-763) that facilitates PC parameter editing and calibration

ENVIRONMENTAL: TEMPERATURE RANGE: -20 to 40 °C (-4 to 104 °F); HUMIDITY: 0–100% non-condensing

WARM UP TIME: < 1 minute when the instrument is in temperature equilibrium with the surrounding environment

DRIFT: less than 0.3 μSv/h (0.03 mR/hr)

POWER: eight rechargeable AA NiMH batteries, supplied with wall charger for direct connection to instrument

BATTERY LIFE: approximately 12 to 30 hours between charges depending primarily upon use of backlighting and USB usage

CONSTRUCTION: durable plastic accompanied by internal metal frame support

SIZE: 21.9 x 11.6 x 24.5 cm (8.6 x 4.6 x 9.6 in.) (H x W x L)

WEIGHT: 1.5 kg (3.4 lb), including batteries
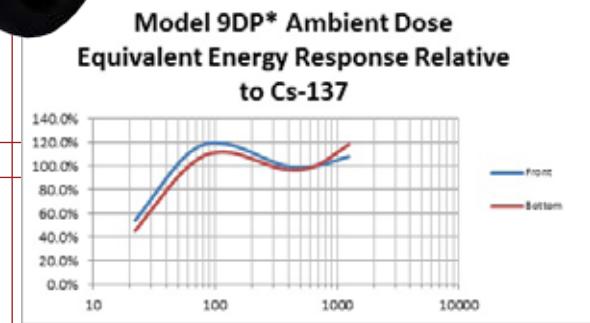
Survey Meters (Ion Chambers)

Model 9-4 Air Ionization Chamber Survey Meter

Introduction

The Ludlum 9-4 is a rugged air ionization chamber for performing beta-gamma dose rate measurements over a 5-decade span ranging from background to 50,000 mR/hr. This instrument is an excellent tool for measuring exposure rates from leakage and scatter radiation around diagnostic and therapeutic X-ray rooms.

The chamber wall, including the instrument case, is 1000 mg/cm². A 1000 mg/cm² retractable beta shield allows beta measurement with a 7 mg/cm² window. The chamber is automatically compensated for temperature and pressure changes.

Part Number: 48-3739

Specifications

RANGE: 0–500 mSv/h (0–50,000 mR/hr)
ENERGY RESPONSE: within 20% of true value from 40 keV to 2 MeV
LINEARITY: Reading within 10% of true value
RESPONSE TIME: Approximately 5 seconds for 90% of final meter deflection on the x1 and x10 scales, and 3 seconds on the x100, x1k and x10k scales
BETA RESPONSE: Factor of 4.8 difference between window open and closed measurements when exposed to a uranium slab
CHAMBER VOLUME: 220 cm³
CHAMBER CONSTRUCTION: Carbon-coated acrylic
SIDE WALL: 1000 mg/cm² aluminum and acrylic
BETA SHIELD: Retractable 1000 mg/cm² phenolic slide with side button control
WINDOW: 7 mg/cm² metalized polyester
WINDOW AREA: 40 cm²
COMPENSATION: Automatically corrects for temperature and pressure changes in atmosphere
TEMPERATURE RANGE: -20 to 50 °C (-4 to 122 °F); temperature compensation maintains calibration within 15% of 25 °C (77 °F) reading
PRESSURE COMPENSATION RANGE: 70–106 kPa
METER: 6.4 cm (2.5 in.) arc, 1 mA, pivot-and-jewel suspension
METER DIAL: 0–5 mR/hr, BAT TEST
CONTROLS:
 * Range Switch: 5 range multipliers x1, x10, x100, x1k, x10k, and instrument off
 * Reset: Pressing the reset button causes the chamber to discharge
 * Bat Test: Pushbutton used to check battery capacity
 * Zero Adjust: 1 turn potentiometer to zero reading
 * Display Light: On/off switch
 * Calibration: Digitally set via USB to serial computer interface, stored in non-volatile memory
POWER: 2 each "D" cell batteries housed in a sealed externally-accessible compartment
BATTERY LIFE: 400 hours
CONSTRUCTION: Cast and drawn aluminum with beige powder-coating
SIZE: 23.4 x 8.9 x 21.6 cm (9.2 x 3.5 x 8.5 in.) (H x W x L) including instrument handle
WEIGHT: 41.9 kg (4.2 lb) including batteries

Options:

Carrying Case: PN: 2311062
5 µCi ¹³⁷Cs Check Source: PN: 01-5186
Calibration Kit: PN: 4293-676
Lighted Handle: PN 4464-154

Survey Meters (GM/Scintillation)

Model 3000 Digital Survey Meter

Part Number: 48-4035

Detector Clip included when purchasing detector/probe

Model 44-9

Part Number: 47-1539

Model 3000 Digital Survey Meter with 44-9 Pancake Probe

Introduction

The Ludlum Model 3000 is a versatile, lightweight, ergonomically-designed instrument with an external detector used for alpha, beta, or gamma radiation survey. Three modes of operation – RATE, MAX, and COUNT – are available for the user. Measurements can be collected in two sets of units (primary and secondary) for RATE and MAX modes in cps, cpm, Bq, dpm, mR/hr, or µSv/h units. The user can switch between two sets of chosen units by simply pressing the Units button.

This instrument features a large, easily-readable LCD (liquid crystal display), a piercing audio warning tone, and easy, intuitive, user-friendly design. Splash-resistant construction allows the Model 3000 to be used outdoors. The unit body is made of lightweight, durable, high-impact plastic. The Model 3000 is shipped ready to use with batteries and calibration certificate.

Specifications

DETECTOR: may be Geiger-Mueller (GM), scintillator, or proportional
ALARMS: count rate, exposure/dose, and scaler alarm setpoints adjustable over the display range
OVERLOAD: high count rate saturation protection prevents false display of lower count rates
LOSS OF COUNT ALARM PROTECTION: after preselected time interval (default 60 seconds) of no pulses from detector, audible and visual alarms will be activated
LCD DISPLAY: 3-digit LCD with large 20 mm (0.8 in.) digits, (k)cps, (k)cpm, (k)Bq, (k)dpm, (µ)(m) R(/h), (µ)(m)Sv(/h), low-battery indicator, MAX, ALARM, AUDIO
DISPLAY RANGE: 0.0 cps to 99.9 kcps; 0.00 cpm to 999 kcpm; 0.00 Bq to 99.9 kBq; 0.00 dpm to 999 kdpm; 0.00 µR/h to 999 R/h; 0.00 µSv/h to 999 Sv/h: Max Display can be set to limit display to calibrated range
BACKLIGHT: built-in ambient light sensor automatically activates low-power LED backlight, unless internal dipswitch is set to continuous-On (will reduce battery life)
USER CONTROLS:
  ON/OFF/QUIET - press to turn ON, tap to acknowledge alarms and silence alarm tone, hold for OFF
  MODE - alternates between NORMAL (count rate), MAX (captures peak rate), and COUNT (user-selectable preset count time from 0 to 10 minutes) Number of modes can be reduced in setup.
  AUDIO - turn "click" audio On/Off
  UNITS - changes the units between count rate (cpm, cps), dose/exposure (µSv/h, mR/h), or disintegration (dpm, Bq)
RESPONSE TIME: user-selectable from 1 to 60 seconds, or Auto-Response Rate FAST or SLOW
AUDIO: greater than 75 dB at 0.6 (2 ft), approximately 4.5 kHz
POWER: four alkaline or four rechargeable "AA" batteries (does not support in-device charging)
BATTERY LIFE: approximately 750 hours of operation (as low as 100 hours with backlight configured for continuous-on), 16-hour low battery warning
CONSTRUCTION: high-impact plastic, water-resistant rubber seals, and separate battery compartment
TEMPERATURE RANGE: -20 to 50 °C (-5 to 122 °F), may be certified for -40 to 65 °C (-40 to 150 °F)
ENVIRONMENTAL RATING: NEMA (National Electrical Manufacturers Association) rating of 4x or IP (Ingress Protection) rating of 65
SIZE: 16.5 x 11.4 x 21.6 cm (6.5 x 4.5 x 8.5 in.) (H x W x L)
WEIGHT: 0.9 kg (2.0 lb)

Model 44-9 GM Pancake Detector
WINDOW: 1.7 ± 0.3 mg/cm^2 mica
WINDOW AREA: Active - 15 cm^2;
 Open - 12 cm^2
EFFICIENCY (4π): 5% for ^{14}C; 22% for ^{90}Sr/^{90}Y; 19% for ^{99}Tc; 32% for ^{32}P; 15% for ^{239}Pu, $\leq$ 1% for ^{99m}Tc; 0.2% for ^{125}I
SENSITIVITY: Typically 3300 cpm/mR/hr (^{137}Cs gamma)
ENERGY RESPONSE: Energy dependent
DEAD TIME: Typically 80 µs

Cable and Detector Clip are included when purchased at same time

Survey Meters (GM/Scintillation)

Model 3019 Digital Background Survey Meter

Introduction

The Model 3019 is Ludlum's lightweight, ergonomically-designed instrument with an internal detector used for gamma radiation survey for background to 500 μSv/hr (50 mR/hr). This instrument features alarm points that can be set through Setup Mode using the onboard keypad, or alternately via the optional software by USB connection. The Sigma Audio feature assists search efforts by responding with an audible alarm detected radiation outside the set parameters.

User-adjustable settings include calibration constant, dead time correction, efficiency, high voltage, pulse threshold, response time (fast or slow), count time, operational modes, HV current overload level, operational mode (Rate, Max, or Count), and minimum and maximum display levels. The user may also set Primary and Secondary units, unit alarm levels, count units, count alarm levels, and zero pulse protection time limit.

This instrument features a large, easily-readable LCD (liquid crystal display), a piercing audio warning tone, and easy, intuitive, user-friendly design. Splash-resistant construction allows the Model 3019 to be used outdoors. The unit body is made of lightweight, durable, high-impact plastic. Model 3019 Digital Survey Meter is shipped ready to use with batteries and calibration certificate..

Part Number: 48-4091

Specifications

DETECTOR: internal CsI, scintillator with 175 cpm/μR/hr sensitivity
ALARMS: alarm setpoints adjustable over the display range
SIGMA: sigma audio beeps when radiation level changes
LOSS OF COUNT ALARM PROTECTION: after preselected time interval (default 60 seconds) of no pulses from detector, audible and visual alarms will be activated
LCD DISPLAY: 3 digit LCD with large 20 mm (0.8 in.) digits, (k)cps, (k)cpm, (k)Bq, (k)dpm, (μ)(m)R(/h), (μ)(m)Sv(/h), low-battery indicator, MAX, ALARM, AUDIO
DISPLAY RANGE: 0.0 cps to 99.9 kcps; 0.00 cpm to 999 kcpm; 0.00 Bq to 99.9 kBq; 0.00 dpm to 999 kdpm; 0.00 μR/h to 999 R/h; 0.00 μSv/h to 999 Sv/h
BACKLIGHT: built-in ambient light sensor automatically activates low-power LED backlight, unless internal dipswitch is set to continuous-On (will reduce battery life)
USER CONTROLS:
  • ON/OFF/QUIET - press to turn ON, tap to acknowledge alarms and silence alarm tone, hold for OFF
  • MODE - alternates between NORMAL (count rate), MAX (captures peak rate), and COUNT (user-selectable preset count time from 0 to 10 minutes)
  • AUDIO - turn audio On/Off
  • UNITS - changes the units between count rate (cpm, cps), dose/exposure (μSv/h, mR/h), or disintegration (dpm, Bq)
RESPONSE TIME: user-selectable from 1 to 60 seconds, or Auto-Response Rate FAST or SLOW
AUDIO: greater than 75 dB at 0.6 (2 ft), approximately 4.5 kHz
POWER: four alkaline or four rechargeable "AA" batteries (instrument does not support in-device charging)
BATTERY LIFE: approximately 750 hours of operation (as low as 100 hours with backlight configured for continuous-on), 16-hour low battery warning
CONSTRUCTION: high-impact plastic with water-resistant rubber seals and separate battery compartment
TEMPERATURE RANGE: -20 to 50 °C (-5 to 122 °F), may be certified for operation from -40 to 65 °C (-40 to 150 °F)
ENVIRONMENTAL RATING: NEMA (National Electrical Manufacturers Association) rating of 4x or IP (Ingress Protection) rating of 65
SIZE: 16.5 x 11.4 x 21.6 cm (6.5 x 4.5 x 8.5 in.) (H x W x L)
WEIGHT: 1.06 kg (2.3 lb)

Survey Meters (GM/Scintillation)

Model 3019

Part Number: 48-4091

- Rate, Max, and Count Modes of Operation
- All-Digital Calibration
- Large Backlit LCD for Ease of Reading

Model 3

Part Number: 48-1605

- 4-Decade Analog Meter
- Supports GM & Scintillator Detectors

Model 12

Part Number: 48-1609

- 4-Decade Analog Meter
- Supports GM, Proportional & Scintillator Detectors

Model 14C

Part Number: 48-1611

- 5-Decade Analog Meter
- Supports a built-in GM detector Plus and External GM or Scintillator Detector

Introduction

Ludlum's survey meters are world-renowned for their robustness, dependability, accuracy, and affordable prices. Many models from different lines offer plenty of choices to better satisfy your technical and budgetary requirements. Be sure to visit the website (www.ludlums.com) to learn more about all specifications and available options.

Specifications

Ludlum Model	High Voltage	Threshold	Detector Channels	Controls	Alarm	Battery Life	Size (H x W x L)	Weight
3019 PN: 48-4091	900 Vdc	-35 mV	1	on/off/quiet, mode, audio, units	Yes	100–750 hours	16.5 x 11.4 x 21.6 cm (6.5 x 4.5 x 8.5 in.).	1.06 kg (2.3 lbs)
3 PN: 48-1605	400–1500 Vdc	-40 mV	1	off, battery check, range selector, audio, fast/slow, reset	No, available with Model 3A	> 2000 hours	16.5 x 8.9 x 21.6 cm 6.5 x 3.5 x 8.5 in.	1.6 kg 3.5 lb
12 PN: 48-1609	400–2500 Vdc	-1 to -100 mV	1	off, battery check, range selector, audio, fast/slow, reset, HV check	No	> 2000 hours	16.5 x 8.9 x 21.6 cm 6.5 x 3.5 x 8.5 in.	1.6 kg 3.5 lb
14C PN: 48-1611	900 Vdc	-40 mV	1	off, battery check, range selector, audio, fast/slow, reset	No	> 2000 hours	17.1 x 8.9 x 21 cm 6.8 x 3.5 x 8.3 in.	1.2 kg 2.6 lb

Survey Meters (GM/Scintillation)

Model 14C

Part Number: 48-1611

Model 44-9

Part Number: 47-1539

Model 14C Survey Ratemeter with Pancake Probe

Introduction

This general purpose, handheld, analog ratemeter supports operating two separate radiation detectors. A switch on the front panel allows the user to select between the internally-mounted GM detector for detecting gamma exposure over a range of 0–2000 mR/hr or the external Model 44-9 GM pancake detector. The pancake detector is sensitive to alpha, beta, and gamma and is the industry standard for detecting contamination. This survey meter additionally supports externally connected scintillation detectors in lieu of GMs. The Model 14C can be used in a wide range of Medical and Health Physics applications. With the addition of the Model 180-2 sample holder, it can also be used to make a quick evaluation of wipe test surveys in the Nuclear Medicine department. Meets 10 CFR 35 requirements (0–2000 mR/hr) for Nuc Med departments

Specifications

Model 14C Survey Meter
MULTIPLIERS: x0.1, x1, x10, x100, x1000
LINEARITY: Reading within ±10% of true value with detector connected
ENERGY RESPONSE: Within ± 15% of true value between 60 keV–3 MeV (internal detector only)
CONNECTOR: Series "C" (others available)
AUDIO: Built-in unimorph speaker with ON/OFF switch (greater than 60 dB at 0.6 m [2 ft])
HIGH VOLTAGE: 900 V (setting can be checked on meter); THRESHOLD: 30 mV ± 10 mV
RESPONSE: Toggle switch for FAST (4 seconds) or SLOW (22 seconds) from 10% to 90% of final reading
POWER: 2 each "D" cell batteries (housed in sealed compartment that is externally accessible)
BATTERY LIFE: Typically greater than 2000 hours with alkaline batteries
TEMPERATURE RANGE: -20 to 50 °C (-4 to 122 °F)
SIZE: 16.5 x 8.9 x 21.6 cm (6.5 x 3.5 x 8.5 in.) (H x W x D)
WEIGHT: 1.6 kg (3.5 lb), including batteries

Model 44-9 GM Pancake Detector (optional)
WINDOW: 1.7 ± 0.3 mg/cm^2 mica
WINDOW AREA: Active - 15 cm^2; Open - 12 cm^2
EFFICIENCY (4π): 5% for ^{14}C; 22% for ^{90}Sr/^{90}Y; 19% for ^{99}Tc; 32% for ^{32}P; 15% for ^{239}Pu, $\leq$ 1% for ^{99m}Tc; 0.2% for ^{125}I
SENSITIVITY: Typically 3300 cpm/mR/hr (^{137}Cs gamma)
ENERGY RESPONSE: Energy dependent
DEAD TIME: Typically 80 μs

*Model 180-2
Sample Holder
PN 47-1665*

Other Options:

Model 44-2 Gamma Detector with 2.5 x 2.5 cm (1 x 1 in.) NaI scintillator: PN: 47-1532
1 μCi ^{137}Cs Check Source: PN: 01-5196
Check Source Holder: PN: 4062-166

Survey Meters (GM/Scintillation)

Model 14C-MERK Response Kit

Introduction

This response kit is an ideal tool for any Emergency Department or Nuclear Medicine Department. It offers a detector complement optimized for medical isotopes, and it includes personal dosimetry protection. The kit will easily meet the (radiation) requirements of an Emergency Response Plan.

The Response Kit includes:

- Model 14C Analog Survey Ratemeter which is designed with an internal energy compensated GM gamma detector capable of measuring gamma exposure levels up to 2000 mR/hr. A switch on the front panel enables the user to select between the internal GM or one of the external probes supplied with the kit.
- Model 44-9 Pancake Probe
- Model 44-2 NaI Scintillation Probe
- Model 25, Personal Dosimeter/Ratemeter allows medical personnel to monitor their safety during activities associated with a radiation incident
- 1 µCi, ^{137}Cs check source
- 1 m (39 in.) long detector cable
- A carrying case for storage and transportation

Part Number: 48-3722

Specifications

Model 14C Specifications

MULTIPLIERS: x0.1, x1, x10, x100, x1000
LINEARITY: Reading within ±10% of true value with detector connected
ENERGY RESPONSE: Within ± 15% of true value between 60 keV–3 MeV (internal detector only)
CONNECTOR: Series "C" (others available)
AUDIO: Built-in unimorph speaker with ON/OFF switch (greater than 60 dB at 2 feet)
HIGH VOLTAGE: 900 V (setting can be checked on meter); THRESHOLD: 30 mV ± 10 mV
RESPONSE: Toggle switch for FAST (4 seconds) or SLOW (22 seconds) from 10% to 90% of final reading
POWER: 2 each "D" cell batteries (housed in sealed compartment that is externally accessible)
BATTERY LIFE: Typically greater than 2000 hours with alkaline batteries
TEMPERATURE RANGE: -20 to 50 °C (-4 to 122 °F)
SIZE: 16.5 x 8.9 x 21.6 cm (6.5 x 3.5 x 8.5 in.) (H x W x D)
WEIGHT: 1.6 kg (3.5 lb), including batteries

Model 44-9, GM Pancake Detector

USE: Alpha, beta, gamma survey
WINDOW: 1.7 ± 0.3 mg/cm^2 mica
WINDOW AREA: Active - 15 cm^2; Open - 12 cm^2
EFFICIENCY (4π): 5% for ^{14}C; 22% for ^{90}Sr/^{90}Y; 19% for ^{99}Tc; 32% for ^{32}P; 15% for ^{239}Pu, ≤ 1% for ^{99m}Tc; 0.2% for ^{125}I
SENSITIVITY: Typically 3300 cpm/mR/hr (^{137}Cs gamma)
ENERGY RESPONSE: Energy dependent
DEAD TIME: Typically 80 µs

Model 44-2, Gamma Scintillator

USE: Low-level, wide-energy gamma survey
SCINTILLATOR: 2.5 x 2.5 cm (1 x 1 in.) (Dia x L) thick NaI
SENSITIVITY: Typically 175 cpm/µR/hr (^{137}Cs gamma)
BACKGROUND: 1900 cpm
ENERGY RANGE: 20 KeV to 1.5 MeV
SIZE: 5.1 x 18.5 cm (2 x 7.3 in.) (Dia x L)
WEIGHT: 0.5 kg (1 lb)

Model 25

DETECTOR: Internal energy-compensated GM
ENERGY RANGE: 60 keV to 2 MeV
DISPLAY: 3½ digit backlit LCD display with a total range from .01 mR/hr (or mR) to 1999 R/hr (or R), also displays time remaining from 19:59 to 00:01 (in hh:mm format).
ALERT & ALARMS: Adjustable over entire range
ALARM INDICATIONS: Distinct alerts and alarms for exposure and accumulated dose
AUDIO: Built-in speaker (Typically 95 dB at 30 cm [1 ft])
LOW BATTERY INDICATION: Provides 8 hours warning of low battery
POWER: 2 each lithium coin cell batteries
BATTERY LIFE: Typically 6000 hrs.
TEMPERATURE RANGE: -40 to 65 °C (-40 to 150 °F)
SIZE: 7.6 x 5.4 x 1.7 cm (3.0 x 2.1 x 0.69 in.) (H x W x D)
WEIGHT: 144 g (5.1 oz), including batteries

Also Available: Model 25-1 displays .001 mSv/h to 19.99 Sv/h Part Number 48-3629

Survey Meters (GM/Scintillation)

Model 2241-1

Alpha-Beta

- Analog Readout Meter with Digital Scaler LCD
- 4-Decade, Manual Ranging
- Supports GM, Proportional and Scintillator Detectors
- 2-Detector Setups
- Alpha/Beta Discrimination

Part Number: 48-2628

Model 2241-2

Multi-Detector

- Digital Readout Meter
- 4-Decade, Auto Ranging
- Supports GM, Proportional and Scintillator Detectors
- Adjustable Rate & Scaler Alarms
- 2-Detector Setups with Front Panel Selector Switch
- Programmable Units
- RS-232 Port

Part Number: 48-2731

Model 2241-3

Multi-Detector

- Digital Readout Meter
- 4-Decade, Auto Ranging
- Supports GM, Proportional and Scintillator Detectors
- Adjustable Rate & Scaler Alarms
- 4-Detector Setups with Front Panel Selector Switch
- Programmable Units
- RS-232 Port

Part Number: 48-2864

Introduction

Ludlum's combination scaler/ratemeters support a wide range of possible applications from simple capturing of accumulated counts to more sophisticated tasks such as alpha-beta contamination frisking or gamma spectroscopy. Our multi-detector meters provide for convenient swapping of detectors, thereby reducing the number of instruments required.

Specifications

Ludlum Model	Detector Setups	High Voltage	SCA	Scaler Times	Alarms	Battery Life	Size (H x W x L)	Weight
2224-1 PN: 48-2679	1	400–2000 Vdc	switch selectable between, alpha, beta or alpha-beta	0.1, 0.5, 1 or 2 minutes	none	350 hours	10.7 x 8.9 x 21.6 cm (4.2 x 3.5 x 8.5 in.)	1.6 kg 3.5 lb
2224-2 PN: 48-2731	1	400–2400 Vdc	none	1–9999 seconds	Ratemeter: Yes Scaler: Yes	200 hours	16.5 x 8.9 x 21.6 cm (6.5 x 3.5 x 8.5 in.)	1.6 kg 3.5 lb
2241-3 PN: 48-2864	4	400–2500 Vdc separate settings stored for each detector	none	1–9999 seconds	Ratemeter: Yes Scaler: Yes	200 hours	16.5 x 8.9 x 21.6 cm (6.5 x 3.5 x 8.5 in.)	1.6 kg 3.5 lb

Survey Meters (GM/Scintillation)

Model 2241-3 MERK Medical Environment Response Kit

Introduction

This response kit is an ideal tool for any Emergency Department or Nuclear Medicine Department. It offers a detector complement optimized for medical isotopes and it includes personal dosimetry protection. The kit will easily meet the (radiation) requirements of the Emergency Response Plan.

The Model 2241-3 MERK Kit includes the:
* Model 2241-3 digital survey ratemeter with built-in scaler
* Model 44-9, 15 cm² GM Pancake Detector
* Model 44-2, 1 x 1 in. NaI Scintillator Detector
* Model 44-142, 100 cm² Beta Scintillator Detector
* Model 25, Personal Dosimeter/Ratemeter allows medical personnel to monitor their safety during activities associated with a radiation incident
* 1 µCi, ^{137}Cs check source
* 1 m (39 in.) long detector cable
* Carrying case, for easy transportation of the kit to the affected site

Part Number: 48-3744

Specifications

Model 2241-3 Digital Survey Meter
DISPLAY: 4-digit LCD display with 1.3 cm (0.5 in.) high digits, separate annunciators for display units, alert, alarm, low battery, detector overload, counting overflow, and scaler counting and Counting.
LCD BACKLIGHT: Pushbutton activated for pre-programmed interval, 5, 15, 30, 60, 90, 120, 180, or 240 seconds
RATEMETER: Programmable units of measurement, autoranging,
SCALER: Adjustable from 1–999999 seconds in 1-second intervals, displayed time base seconds or minutes
UNITS: R/hr, Sv/hr, cpm, cps, and counts
ALARMS: Ratemeter Mode: programmable over entire range, Scaler Mode: adjustable from 1 to 999999 counts
AUDIO: Built-in speaker, 60 dB at 0.6 m [2 ft], internal adjustable volume, audio divide by 1,10,100, or 1000 events/click
LINEARITY: ± 10% of true value
CONTROLS: Selector switch for choosing between 4 different detector setup parameters, Ratemeter/Scaler Mode switch, Audio On/Off switch, Fast/Slow Response switch, Light button, Reset button
RESPONSE: Choice of Variable (default) or Fixed. All times correspond to a range of 10% to 90% of final reading
RS-232: 150–19.2 K bps, used for setup and data streaming at 2 second intervals, "D" type connector (*see website for more details*)
POWER: 2 each "D" cell batteries (housed in sealed compartment that is externally accessible)
BATTERY LIFE: Typically 200 hours with alkaline batteries
TEMPERATURE RANGE: -20 to 50 °C (-4 to 122 °F)
SIZE: 16.5 x 8.9 x 21.6 cm (6.5 x 3.5 x 8.5 in.) (H x W x L)
WEIGHT: 1.6 kg (3.5 lb) including batteries

Model 44-9, GM Pancake Detector
WINDOW: 1.7 ± 0.3 mg/cm² mica
WINDOW AREA: Active - 15 cm²; Open - 12 cm²
EFFICIENCY (4π): 5% for ^{14}C; 22% for ^{90}Sr/^{90}Y; 19% for ^{99}Tc; 32% for ^{32}P; 15% for ^{239}Pu, ≤ 1% for ^{99m}Tc; 0.2% for ^{125}I
SENSITIVITY: Typically 3300 cpm/mR/hr (^{137}Cs gamma)
ENERGY RESPONSE: Energy dependent
DEAD TIME: Typically 80 µs

Model 44-2, Gamma Scintillator
USE: Low-level, wide-energy
SCINTILLATOR: 2.5 x 2.5 cm (1 x 1 in.) (Dia x L) thick NaI
SENSITIVITY: Typically 175 cpm/µR/hr (^{137}Cs gamma)
BACKGROUND: 1900 cpm
ENERGY RANGE: 20 KeV to 1.5 MeV
SIZE: 5.1 x 18.5 cm (2 x 7.3 in.) (Dia x L)
WEIGHT: 0.5 kg (1 lb)

Model 44-142, Beta Scintillator
USE: Beta contamination survey
AREA: 100 cm² active, 89% open
SCINTILLATOR: 0.025 cm (0.010 in.) thick plastic
WINDOW: 1.2 mg/cm²
EFFICIENCY: 4% for ^{4}C; 30% for ^{90}Sr/Y; 20% for ^{99}Tc
BACKGROUND (10 µR/hr): typically 300 cpm or less
SIZE: 36.4 x 9.5 x 31.1 cm (2.5 x 3.8 x 12.3 in.)
WEIGHT: 0.5 kg (1 lb)

Model 25
DETECTOR: Internal energy-compensated GM
DOSE RATE RANGE: 0–1000 R/hr
DOSE RANGE: 0–1999 R
ENERGY RANGE: 60 keV to 2 MeV
DISPLAY: 3½ digit backlit LCD
ALERT & ALARMS: radiation alarms adjustable over entire range
ALARM INDICATIONS: distinct alerts and alarms for exposure and accumulated dose
AUDIO: Built-in speaker, 95 dB at 30.5 cm (1 ft)
LOW BATTERY INDICATION: Gives 8 hours warning of low battery
POWER: 2 lithium coin cell batteries
BATTERY LIFE: Typically 6000 hrs.
TEMPERATURE RANGE: -40 to 65 °C (-40 to 150 °F)
SIZE: 7.6 x 5.4 x 1.7 cm (3.0 x 2.1 x 0.69 in.) (H x W x D)
WEIGHT: 144 g (5.1 oz), including batteries

NOTE: not intended to measure background levels of radiation

Personal Dosimeters / Pocket Meters

Model 23 mrem Electronic Personal Dosimeter

Introduction

The Ludlum Model 23 mrem Electronic Personal Dosimeter is a compact and lightweight (2.1 oz) pen-type Personal Dosimeter. It is ideal for the measurement and general monitoring of gamma and x-ray radiation in medical and laboratory environments, as well as any controlled or restricted area where personal radiation monitoring is required. The unit is sensitive to a wide range of energies from: 35 keV to 3 MeV. Dose, Dose Equivalent Rate and Alarm values are easily seen on the 4 digit LCD Screen. An audible alarm is activated if the dose or dose rate exceeds the preset value of the dosimeter. The alarm set points are adjustable from the face of the EPDi unit.

For users with multiple EPD units the optional Model 23 mrem Reader/Software kit can be used to quickly take data directly from the EPDi Dosimeter via Infrared communication, to the users PC. The software also allows the user to set or change alarm set points quickly.

Part Number: 51-2958

Part Number: 51-2959

Specifications

INDICATED USE: dosimetry monitoring of personnel

DOSE AND DOSE RATE MEASUREMENT DISPLAY RANGE:

(0.001 mSv/h to 999.9 mSv/h)	0.1 mrem/hr to 99.99 rem/hr
(0.001 mSv to 999.9 mSv)	0.1 mrem to 99.99 rem

Accumulated dose data is automatically deleted when Model 23 EPD is switched 'On'.

DETECTOR: silicon semiconductor

RADIATION DETECTED: gamma and X-ray (35 keV to 3 MeV)

DISPLAY: 4-digit liquid crystal display, with dose rate, low battery, overflow

ACCURACY/LINEARITY: +/- 10% from 0.01 to 999.9 mSv; 1.0 mrem to 99.99 rem (^{137}Cs)

ALARM OUTPUT: low, medium, high user-settable volume, and OFF

ALARM VOLUME: approximately 60 dB

SENSITIVITY: approximately 2 cpm/μSv/h (20 cpm/μR/hr) (^{137}Cs gamma)

DATA LOGGING: 600 records (optional IR reader required for data transmission to PC)

ENVIRONMENT: -10 to 40 °C (14 to 104 °F); ≤ 90% relative humidity (non-condensing)

POWER: one each coin-type lithium battery (CR2450) Part Number 21-8639

BATTERY LIFE: typically one month at eight hours per day in non-alarm status

SIZE: 110 x 30 x 12 mm (4.3 x 1.8 x 0.5 in.) (H x W x D) without clip

WEIGHT: 55.9 g (2 oz.)

OPTION: The IR Reader, shown above, allows the user to grab collected radiation dose information and send the data to a PC. Included software allows the data to be placed into a retrievable file. Simple display and alarm changes on the dosimeter are also enabled. (Part Number 51-2959)

ALSO AVAILABLE: Model 23-1 as above, but measures in Sieverts (Part Number 51-2961)

Personal Dosimeters / Pocket Meters

## Model 25 Personal Radiation Monitor

Introduction

The Ludlum Model 25 Personal Radiation Monitor is a small, lightweight, and yet rugged (shock proof and water resistant), alarming dosimeter. The Model 25 continuously monitors and alerts medical or hazmat personnel to the presence of radiation while also keeping track of the accumulated dose. The dual audible and visual alarms are adjustable over the entire display range.

    Dose Rate: .01 mR/hr to 1999 R/hr

    Dose: .01 mR to 1999 R

Calculated 'stay-time' to the programmed alarm is displayed by pressing the Mode key.

This instrument is also available in an 'Intrinsically Safe' version for use in Hazmat or Surgical Applications, where explosive gasses may be an issue. The Model 25 may also be used for monitoring the (real-time) daily accumulated dose of pregnant employees in Nuclear Medicine departments and Radiology/Fluoroscopic environments throughout the medical center. A protective Rubber Case and Lanyard are provided with this instrument.
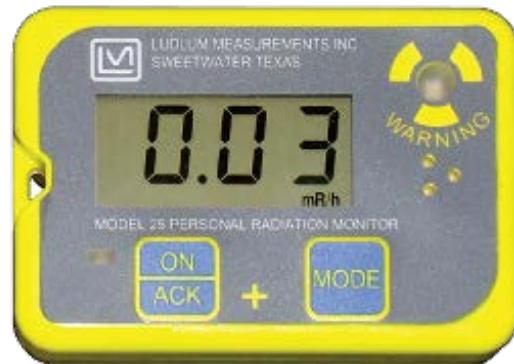
Part Number: 48-3584

Specifications

DISPLAY RANGE: .01 mR/hr to 1,000 R/hr

DETECTOR: Internal energy-compensated GM

GAMMA SENSITIVITY: 18 cpm/mR/hr

ENERGY RANGE: 60 keV to 2 MeV

DISPLAY: 3½ digit backlit LCD display with a total range from .01 mR/hr (or mR) to 1999 R/hr (or R), also displays time remaining from 19:59 to 00:01 (in hh:mm format)

ALARMS: Radiation alarms adjustable over entire range

1) Dose rate alert	5) Time remaining to allowed dose (hi)
2) Dose rate (hi)	6) Time remaining to allowed dose (hi)
3) Accumulated dose alert	7) Detector failure
4) Accumulated dose (hi)	8) Low battery notice when only 8 hours remain

ALARM INDICATIONS: Distinct alerts and alarms for exposure and accumulated dose

AUDIO: Built-in speaker (typically 95 dB at 30.5 cm [1 ft])

LOW BATTERY INDICATION: Provides 8 hours warning of low battery

LOSS OF COUNT: Detector failure results in a visual and audible warning

CALIBRATION: Requires no tools or software when exposed to a traceable radiation field

CALIBRATED RANGE: normally calibrated from 2 mR/hr (0.02 mSv/h) to 999 R/hr (9.99 Sv/h)

POWER: 2 each lithium coin cell batteries

BATTERY LIFE: Typically 6000 hours

CONSTRUCTION: Injection-molded plastic housing with sub-surface printed membrane front panel, completely gasketed for water resistance, supplied with rubber boot with built-in belt feed-through

TEMPERATURE RANGE: -40 to 65 °C (-40 to 150 °F)

SIZE: 7.6 x 5.4 x 1.7 cm (3.0 x 2.1 x 0.69 in.) (H x W x D)

WEIGHT: 144 g (5.1 oz), including batteries

       NOTE: not intended to measure background levels of radiation

Also Available

Model 25-1 Personal Radiation Monitor (sieverts) PN 48-3629

Model 25-IS, Intrinsically Safe per US standards Personal Radiation Monitor (rems) PN: 48-3661

Model 25-IS-1 Intrinsically Safe per US standards Personal Radiation Monitor (sieverts) PN 48-3686

Arm Band, PN: 21-8974

Nylon Case, PN: 2311485

Model 25-1

Part Number: 48-3629

Model 25-IS

Part Number: 48-3661

Model 25-IS-1

Part Number: 48-3686

Personal Dosimeters / Pocket Meters

Model AT-138

Part Number: 51-2936

Model AT-909 Dosimeter Charger

Part Number: 51-2938

Model SCI-Charger (Hand Powered Charger)

Part Number: 51-2940

Direct Read Dosimeter / Charger

Introduction

The Classic Model AT series, Direct Read Quartz/Carbon Fiber Pocket Dosimeters are available in a variety of monitoring ranges. The Low energy Model AT-138 (0–200 mR) may be used in Laboratory or Medical environments where gross accumulated dose measurements may be required for documentation of worker and visitor traffic in restricted areas.

Specifications

RANGE: 0–200 mR
ENERGY RESPONSE: 16 keV to 2 MeV
RADIATION DETECTED: gamma and X-ray from 16 keV to 6 MeV
ENERGY RESPONSE: see response curve
DETECTOR: fiber electrometer mounted in an electrically conducting plastic ion chamber
DETECTOR HOUSING: very low permeability plastic, hermetically sealed
ACCURACY: within 10% of true exposure
RATE RESPONSE: dose rate independent for gamma and X-radiation
ELECTRICAL LEAKAGE: less than 1.0% of full scale for 24 hours at 50 °C (122 °F)
TEMPERATURE RANGE: -20 to 50 °C (-4 to 122 °F)
RELATIVE HUMIDITY: up to 90%
DIMENSIONS: 1.5 x 12.4 cm (0.6 x 4.5 in.) (Dia x L)
WEIGHT: 25 g (1.0 oz)
FINISH: barrel and end caps: natural matte black; clips: color coded plastic (color signifies range) or metal clips
WARRANTY: 2 year limited warranty
QUALIFICATIONS:
   Meets ANSI Specifications N13.5 and N322-1997
   * Low Leakage: Measures Background

Also Available

Model AT-909 Charger - a compact, lightweight instrument designed to charge direct reading pocket dosimeters. Battery powered, one-turn potentiometer control to remove all residual charge and ensure accurate readings. PN: 51-2938

Model SCI-Charger -can zero a variety of quartz and carbon fiber dosimeters by squeezing the lever of a piezoelectric generator. This unit requires no batteries. PN: 51-2940

Personal Dosimeters / Pocket Meters

Model 2401-P   Front View

Part Number: 48-2875

Back View with Optional Belt Clip

Pocket A/B/G Survey Meter

Introduction
The Model 2401-P instrument is a general purpose, pocket size alpha, beta, gamma survey meter designed around the venerable GM pancake detector. The detector is conveniently packaged inside the instrument with a protective screen window. This instrument is available with a variety of meter faces for measuring contamination and exposure rate in either R or Sv units

This meter is ideal for measuring low-level surface contamination of beta emitting isotopes, or for locating dropped or lost (therapeutic) seeds in the Radiology or Nuclear Medicine departments.

Specifications
INDICATED USE: Alpha, beta, gamma survey
DETECTOR: pancake GM with stainless steel protective screen (79% open)
SENSITIVITY: Typically 3300 cpm/mR/hr (^{137}Cs gamma)
ENERGY RESPONSE: Energy dependent
METER DIAL: 0–0.15 mR/hr; 0–500 cpm, BAT OK
MULTIPLIERS: x1, x10, x100
RANGE: 0–15 mR/hr; 0–50,000 cpm
LINEARITY: Reading within ±10% of true value
AUDIO: Built-in unimorph speaker (Quiet position turns audio OFF)
CALIBRATION CONTROLS: Accessible from front of instrument (protective cover provided)
RESPONSE: Typically 5 seconds from 10% to 90% of final reading
POWER: 1 each 9 volt battery
BATTERY LIFE: Typically 250 hours with alkaline batteries (battery condition can be checked on meter)
METER: 6.4 cm (2.5 in.) arc, 1 mA analog type
CONSTRUCTION: drawn-and-cast aluminum with beige powder-coat and recessed subsurface-printed membrane panel
TEMPERATURE RANGE: -20 to 50 °C (-4 to 122°F)
SIZE: 4.6 x 8.4 x 13.5 cm (1.8 x 3.3 x 5.3 in.) (H x W x L)
WEIGHT: 0.4 kg (0.9 lb), including battery

Options
Belt Clip, PN: 4397-176
L-Shape Handle, PN: 4397-165
Air & Watertight Hard Shell Case, PN: 2311119
Canvas Case, PN: 2310517
1 µCi, ^{137}Cs Check Source, PN: 01-5196

Model 2401-P with L-Handle and Canvas Case (see options list)

Personal Dosimeters / Pocket Meters

Model 25

Model 25-IS

Model 25-IS-1

• 0 to 999 R/hr Dose Rate Range
• 0 to 999 R Accumulated Dose Range
• Loud Alarms
• Lightweight
• Rugged
• Easy to Use
• 6000 Hour Battery Life
• Backlit LCD Display

• Intrinsically Safe Dosimeter
• 0 to 999 R/hr Dose Rate Range
• 0 to 999 R Accumulated Dose Range
• Loud Alarms
• Lightweight
• Rugged
• Easy to Use
• 6000 Hour Battery Life
• Backlit LCD Display

• Intrinsically Safe Dosimeter
• 0.001 mSv/h to 9.99 Sv/h Dose Rate Range
• 0 to 999 Sv Accumulated Dose Range
• Loud Alarms
• Lightweight
• Rugged
• Easy to Use
• 6000 Hour Battery Life
• Backlit LCD Display

Model	Detection Range	Alarm	Battery Life	Part Number
25	0.01 mR/hr to 999 R/hr	Yes	6000 hours	48-3584
25-IS	0.01 mR/hr to 1,000 R/hr	Yes	6000 hours	48-3661
25-IS-1	0.001 mSv/h to 10 Sv/h Dose Rate Range	Yes	6000 hours	48-3686

Personal Dosimeters / Pocket Meters

Model 2401-P

- Integrated Meter with GM Pancake Probe
- Simple to Use
- Low Cost
- Alpha and Beta Gamma Survey

Model 2401-S

- Integrated Meter with Internal Scintillator Detector
- Audio & Visual Alarm
- Simple to Use
- Low Cost μR meter

Model 2402

- Pocket Size Ratemeter
- Accommodates a Variety of GM detectors
- Audio & Visual Alarm
- Metallic Case
- Easy to Use

Model	Sensitivity [137]Cs	Alarm	Battery Life	Part Number
2401-P	3300 cpm/mR/hr	No	250 hours	48-2875
2401-S	120 cpm/μR/hr	No	250 hours	48-3117
2402	detector dependent*	Yes	250 hours	48-3087

*APPLICABLE DETECTORS: Ludlum Models 44-6, 44-7, 44-9, 44-38

Area / Portal Monitors

375-Series
Area Monitoring System

Gamma Area Monitoring Systems

The Model 375 is a versatile, compact and very affordable digital electronic controller designed for monitoring radiation in areas. Its simple design accommodates many different detectors suiting a wide variety of applications and is equipped with a local readout and alarms. These versatile units may also be connected to an optional remote indicator/annunciator for alerting personnel at other locations. The user-friendly, digital design enhances setup and operation. These units may also be networked to a central PC-based station where data are logged and alarms posted. Below are examples of popular, pre-configured systems employing the Model 375 controller. Contact Ludlum to receive a quote for a system best meeting all your needs.

Model	Detector Range	Detector	Part Number
375	*Controller only, no detector included*	*Supports GM, scintillator or proportional detector types*	*48-2230*
375/1	.001–99.99 µSv/h (0.1–9999 µR/hr)	18 mm CsI Scintillator	48-3831
375/2	1 µSv/h–10 mSv/h (0.1 mR/hr–1.0 R/hr)	Energy compensated GM	48-2410
375/4	10 µSv/h–100 mSv/h (1.0 mR/hr–10 R/hr)	Energy compensated GM	48-2411
375-9	Any 5 consecutive decades between 1 µSv/h–10 Sv/h (0.1 mR/hr–1.0 kR/hr)	Ion chamber	48-3036 & 47-3324
375-10	1 µSv/h–20 mSv/h (100 µR/hr–2.0 R/hr)	5.1 x 5.1 cm (2.0 x 2.0 in.) NaI Scintillator with removable shield	48-3443

*24v version allows stack light or strobe light to operate on battery power (PN: 4558-453)

Model 375 Controller Specifications

DISPLAY: four-digit LED display with 2 cm (0.8 in.) digits
DISPLAY RANGE: 000.0–9999
DISPLAY UNITS: can be made to display in µR/hr, mR/hr, R/hr, µSv/h, mSv/h, Sv/h, µrem/hr, mrem/hr, rem/hr, cpm, cps, and others
LINEARITY: reading within 10% of true value
RESPONSE: typically three seconds from 10%–90% of final reading
STATUS: green light, instrument functioning properly
ALARMS:
  • Low Alarm: yellow light, 1 beep/second audible, selectable range: 0 to 9999
  • High Alarm: red light, 4 beeps/second audible, selectable range: 0 to 9999
  • Detector Fail: red light, constant audible tone > 68 dB at 61 cm (2 ft)
  • Low Bat: yellow light, indicates less than two hours of battery life remaining
OVERLOAD: senses detector saturation
OVERRANGE: indicates radiation field being measured has exceeded counting range of instrument
DATA OUTPUT: nine-pin connector providing five-decade logarithmic output, RS-232 output, signal ground connection, FAIL, and ALARM signals (current sink), and direct connection to battery and ground
CALIBRATION CONTROLS: accessible from front of instrument (protective cover provided)
POWER: 9 Vdc wall-mount adapter, handles any mains voltage in the world, supplied with four sets of prongs for almost any style wall receptacle
BATTERY LIFE: typically 48 hours in non-alarm condition; 12 hours in alarm condition
BATTERY CHARGER: battery is continuously trickle-charged when instrument is connected to line power and turned on
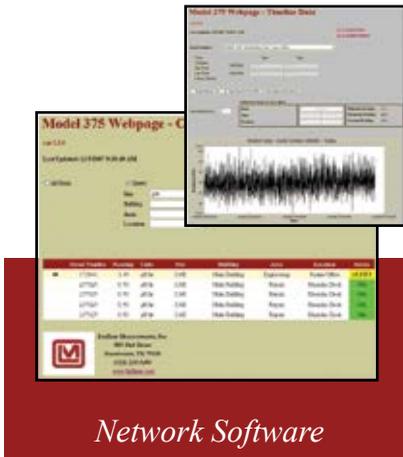CONSTRUCTION: wall mount aluminum housing with ivory powder coat
SIZE: 18.7 x 24.6 x 6.4 cm (7.4 x 9.7 x 2.5 in.) (H x W x D)
WEIGHT: 2.1 kg (4.7 lb)

Area / Portal Monitors

Ethernet Connectivity with a WebPage Interface

Data is logged to a Microsoft Access® database and also a comma-delimited file. The rate at which the data is logged is user-defined and data can be logged at a different rate when an alarm occurs. Readings are sent from the Model 375 every two seconds. An indicator bar under each reading changes color to indicate the current status of the monitor.
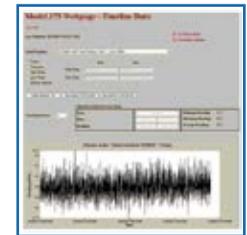
Up to nine email addresses can be programmed into the system to automatically alert responsible individuals on a shift-by-shift basis as well as by type of event.

Network Software

Part Number: 1370-077
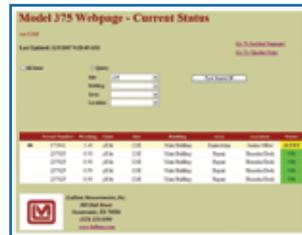
Current Status

Incident Summary

Timeline Data

Optional Remote Indicators/Annunciators

271
Indicators

Part Number: 48-2475

272
Indicators/Meter

Part Number: 48-2656

272D
Digital Display

Part Number: 48-3575

Optional Accessories

Camera

Part Number: 4511-840

Printer

Part Number: 4396-072

NEMA Enclosure

Part Number: 48-3575

110 Vac Red Strobe

Part Number: 4396-171

220 Vac Red Strobe

Part Number: 4396-173

Area / Portal Monitors

Model 375 Controller

Part Number: 48-3470-1

Detectors (*two included with system*)

Model 375P-1000   Waste Survey Monitor

Introduction
The Ludlum 375P-1000 Waste Survey Monitor is ideal for inspecting outgoing trash and/or medical waste for possible low-level radioisotope contamination. The system continuously monitors background levels and will alert the user when the infrared sensors detect a contaminated object. Once the object is removed, the system will return to normal (background) monitoring.

The Waste Survey Monitor will easily pay for itself in the prevention of just one contaminated shipment. Fines assessed by the various regulatory agencies are significantly more than the cost of installing this monitor at your facility.

Options include a red strobe light alarm and a date and time printer to document the occurrence of the detected contaminant.

Specifications
DETECTOR: 2 ea. 7866 cm³ (480 in³) plastic scintillation detectors with 0.33 cm (0.13 in.) lead shielding in weathertight housings
DISPLAY: 4-digit LED display with 2 cm (0.8 in.) digits
RANGE: 0.0 to 9999 kcps
LINEARITY: reading within 10% of true value
RESPONSE: typically 3 seconds from 10% to 90% of final reading
STATUS: (green light) instrument functioning properly
SIGMA ALARM: indicated by red ALARM light and audible tone (can be set at any point from 0.0 to 999 Sigma)
SUM ALARM: indicated by red ALARM light and audible tone (can be set at any point from 0.0 to 9999 kcps) Note: audible alarm annunciators can be configured as a single beep if desired
DET FAIL: red light and audible tone greater than 68 dB at 71 cm (24 in.) indicates no counts from detector or instrument failure
LOW BAT: (yellow) indicates less than 2 hours of battery power remaining
OVERRANGE: indicates radiation field being measured has exceeded counting range of instrument (indicated by display reading "——")
RELAY OUTPUT: mains (120 or 240 Vac) output on alarm
DATA OUTPUT: 9-pin connector for RS-232 output, signal ground connection, FAIL and ALARM signals (current sink), and direct connection to battery and ground
CALIBRATION CONTROLS: accessible from front of instrument (protective cover provided)
POWER: 95 to 135 Vac (178 to 240 Vac available), 50 to 60 Hz, 6-volt sealed lead-acid rechargeable battery (built-in)
BATTERY LIFE: typically 24 hours in non-alarm condition; 12 hours in alarm condition
BATTERY CHARGER: battery is continuously trickle-charged when instrument is connected to line power and turned on
CONSTRUCTION: aluminum housing with ivory powder-coat
TEMPERATURE RANGE: -15 to 50 °C (5 to 122 °F)
SIZE:
    electronics: 26.2 x 24.6 x 8.4 cm (10.3 x 9.7 x 3.3 in.) (H x W x D)
    detectors (ea.): 20.3 cm x 183 cm (8 x 72 in.) (Dia x L)
WEIGHT:
    electronics: 4.2 kg (9.3 lb)
    detectors (ea.): 29.5 kg (65 lb)

Area / Portal Monitors

Model 375P-336   Surface Contamination Monitor

Introduction

The Model 375P-336 is a Digital Model 375 Controller coupled to two 2753 cm (168 in) plastic scintillation detectors. This instrument is ideal for monitoring personnel or laundry for possible contamination in the nuclear medicine department. The monitor may also be used as a radiation contamination triage device to alert emergency department personnel of potentially contaminated patients or equipment coming into the emergency room.

Using hand held instruments for inspecting items can, in many cases, be too time-consuming. The Model 375P-336 allows a more rapid and uniform inspection by placing two relatively large scintillation detectors in proximity to the incoming or outgoing articles undergoing inspection. Both detectors are continuously monitored by the digital controller so any offending item can immediately trigger an alarm. Alarm conditions can be set up to automatically halt production conveyance devices, notify the central office, and even alert key personnel to initiate an immediate response.

Ludlum Measurements encourages the use of an optional rail, Part Number 2311167, in those environments where equipment, carts, or other traffic might strike and damage the detectors.

Part Number: 48-3285

Specifications

DETECTOR: 2 ea. 2753 cm³ (168 in³) plastic scintillation detectors. Each detector is supplied with a 15.2 m (50 ft) coaxial cable.
DISPLAY: 4-digit LED display with 2 cm (0.8 in.) digits
DISPLAY UNITS: can be made to display in μR/hr, mR/hr, R/hr, μSv/h, mSv/h, Sv/h, cpm, cps, and others
RANGE: 0.0 to 9999 kcps
LINEARITY: reading within 10% of true value
RESPONSE: typically 3 seconds from 10% to 90% of final reading
STATUS: (green light) instrument functioning properly
SIGMA ALARM: indicated by red ALARM light and audible tone (can be set at any point from 0.0 to 999 sigma)
SUM ALARM: indicated by red ALARM light and audible tone (can be set at any point from 0.0 to 9999 kcps) NOTE: audible alarm annunciators can be configured as a single beep if desired
DET FAIL: (red light and audible tone; greater than 68 dB at 61 cm [24 ft]) indicates no counts from detector or instrument failure
LOW BAT: (yellow) indicates less than 2 hours of battery power remaining
OVERRANGE: indicates radiation field being measured has exceeded counting range of instrument (indicated by display reading "——")
RELAY OUTPUT: mains (120 or 240 Vac) output on alarm
9-pin connector providing RS-232 output, signal ground connection, FAIL and ALARM signals (current sink), and direct connection to battery and ground
CALIBRATION CONTROLS: accessible from front of instrument (protective cover provided)
POWER: 95 to 135 Vac (178-240 Vac available), 50 to 60 Hz, 6-volt sealed lead-acid rechargeable battery (built-in)
BATTERY LIFE: typically 24 hours in non-alarm condition
BATTERY CHARGER: battery is continuously trickle-charged when instrument is connected to line power and turned on
CONSTRUCTION: aluminum housing with ivory powder coat
TEMPERATURE RANGE: -15 to 50 °C (5 to 122 °F)
SIZE:
   electronics: 26.2 x 24.6 x 8.4 cm (10.3 x 9.7 x 3.3 in.) (H x W x L)
   detectors (ea.): 104.1 x 17.1 x 5.4 cm (41 x 6.75 x 2.125 in.) (H x W x L)
WEIGHT:
   electronics: 4.2 kg (9.3 lb)
   detectors (ea.): 10.7 kg (23.5 lb)

Check Sources / Carry Cases

Check Sources

Check Source Holder

Carrying Cases

Survey Meter Check Sources / Cases

Check Sources

A variety of check sources are available in a broad range of activity, to confirm proper operation of radiation detection equipment or for training purposes. Those listed below are the most common: call Ludlum if you require others.

1 µCi, ^{137}Cs, PN: 01-5196
5 µCi, ^{137}Cs, PN: 01-5186
1 µCi, ^{60}Co, PN: 01-5187

Check Source Holder

An optional Check Source Holder is available for easy mounting of a check source to survey and monitoring equipment. It is typically attached to the side of the instrument, and features a hinged cover to protect the enclosed source from incidental damage.

Mechanical Check Source Holder, PN: 4062-166

Carrying Cases

An assortment of cases are available for our survey meters and monitors.

Cases are rugged, charcoal colored, with padlock-able clasps, sturdy latches, and include dense foam padding to protect sensitive instruments.

Weatherproof
Small   PN: 2311062
Medium   PN: 2311063
Large   PN: 2311064

Air-tight & Weatherproof
Small   PN: 2310278
Medium   PN: 2310330
Large   PN: 2310327

Diagnostic Test Tools

Model L-100 PTW Universal Multimeter

Introduction

The Ludlum Model L-100 PTW Universal Multimeter is designed for the QC evaluation of a wide variety of X-ray machines, including standard radiographic, fluoroscopic, portable, mammography, and CT, as well as dental and panoramic units.

The automatic features of the L-100 measure peak kV, exposure time, and dose output of the X-ray unit quickly and easily. Simply position the L-100 so that it is located within the radiation beam of the X-ray unit. The display will show the measured kV, exposure time, and dose of the X-ray equipment being evaluated.

There is also an analog output, which connects to an oscilloscope to view the voltage waveform.

Part Number: 99-9200

Specifications

IRRADIATION TIME:	0.3 ms to 999 seconds
DIGITAL RESOLUTION:	3300 milliseconds
VOLTAGE:	22 to 150 kV
DIGITAL RESOLUTION:	± 0.1 kV
ENERGY DEPENDENCE:	less than ± 2 %
REPRODUCABILITY:	less than ± 0.5%
OPERATING TEMP.:	15 to 35 °C (59 to 95 °F)
DIMENSIONS:	15.5 x 9.5 x 4.5 cm (6.1 x 3.8 x 1.8 in.)
WEIGHT:	750 g (1.7 lb)

Accessory Filters

Options

Model L-25018	Oscilloscope Cable, 10 m	PN: 99-9201
Model L-522038	Soft Carrying Case,	PN: 99-9202

Accessories

Model L-430 (Part No. 99-9400) Standard Purity Aluminum Filter Set
Specifications: Set of eleven 10 cm x 10 cm plates in the following thicknesses: 5 each 1.0 mm plates; 2 each 0.5 mm plates; and 4 each 0.1 mm plates
Model L-434 (Part No. 99-9401) Ultra High Purity Aluminum Filter Set (for Mammography Applications)
Specifications: Set of six 10 cm x 10 cm plates in the following thickness: 6 each 0.1 mm plates
Model L-431 (Part No. 99-9402) Standard Purity Copper Plates (for higher energy generators)
Specifications: Set of ten 10 cm x 10 cm plates in the following thicknesses: 4 each 1.0 mm plates; 2 each 0.5 mm plates; and 4 each 0.1 mm plates
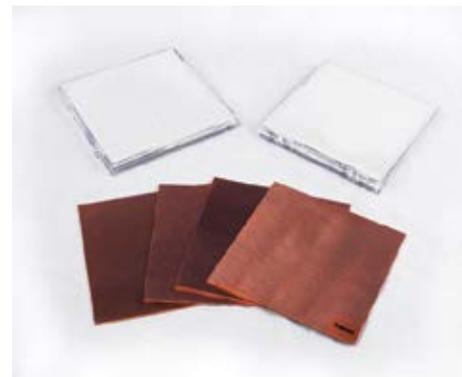
Diagnostic Test Tools

Model L-116

Part Number: 99-9427

Model L-435

Part Number: 99-9428

TG-51 Linac Filter

The new Ludlum CR/DR TG-116 Filter Holder Set is designed to simplify the filtration requirements needed to achieve the needed beam hardening conditions necessary to reach the desired Exposure DI for the various anatomical views being established.

The copper filter is permanently bonded to the polycarbonate base material. The copper filter is covered with an acrylic pocket. The pocket, open on one side, will hold all of the provided filters*. The polycarbonate material is easily cut with a standard utility knife or shears to accommodate the two most common collimator track sizes in a given department. The base may also be attached with the provided hook and loop strips for odd sized collimators.

Specifications
ACRYLIC PLATE: 22.9 x 22.9 cm (9 x 9 in.) (L x W)
POCKET: 10 x 10 cm (3.9 x 3.9 in.) (L x W), 6 mm (0.2 in.) high

*The TG-116 Filter Holder comes with four 1 mm Al filters and one 0.5 mm Al filter.

HVL Filter Holder

The new Ludlum L-435 HVL Filter Holder is designed to simplify the routine HVL measurement process. For years the method of attaching the HVL filters to the X-ray collimator involved using quantities of medical/surgical tape. While tape does the job, it also tends to destroy the thinner aluminum filters; particularly the high purity mammography filters.

The Model L-435 HVL Filter Holder eliminates the need to use tape to attach the HVL filters to the collimator housing.

The filter holder consists of a polycarbonate base 24.1 x 24.1 cm (9.5 x 9.5 in.). Permanently bonded to the center of the base plate is an acrylic pocket, open on one side and designed to hold a standard or high purity Al filter set. The polycarbonate material is easily cut with a standard utility knife or sheers to accommodate the two most common collimator track sizes in a given department. The base may also be attached with the hook-and-loop type fastener strips supplied for odd sized collimators. In either case, the filters themselves are protected from damage associated with the application and removal of heavy medical/surgical tape.

Specifications
BASE MATERIAL: polycarbonate, 24.1 x 24.1 cm (9.5 x 9.5 in.)
FILTER POCKET: Acrylic, 10.2 mm x 10.2 mm x 9 mm

Options
Model L-430 Standard Aluminum HVL Filter Set
(Part Number: 99-9400)
Model L-431 Copper HVL Filter Set (Part Number: 99-9402)
Model L-434 Ultra High Purity Aluminum HLV Filter Set
(Mammography) (Part Number: 99-9401)
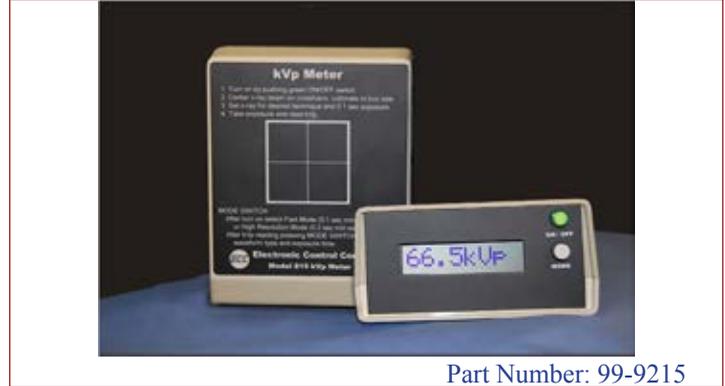Model L-116 CR/DR TG-116 Filter Holder Set

Diagnostic Test Tools

Model L-8900 RS

Part Number: 99-9218

Model L-815

Part Number: 99-9215

Dose Meter / Exposure Time Meter

The Ludlum Model 8900 RS Dose Meter / Exposure Time Meter is specifically designed to measure X-ray dose. The Model 8900 can also be used for dental X-ray units, radiographic and fluoroscopic X-rays.

The Model 8900 RS automatically resets at the beginning of each exposure, holding the reading until the next exposure. There is no need to reset the meter before each measurement.

The Model 8900 RS is a small hand held battery operated unit. Each X-ray exposure is displayed on a 2x12 digit liquid crystal display (LCD). The operator can select between English (mR) and SI (µGy) units. The instrument works for half-wave, full-wave, multiphase or DC (constant potential) X-ray generators. When a measurement is being made, the Model 8900 has the capability of automatically determining the type of X-ray that is being measured.

Specifications
DOSE RANGE: 1 mR to 2000 mR
0.01 mGy to 20 mGy
10 µGy to 20000 µGy
ACCURACY: 3% +/- 1 mR
2% +/- 2 millisecond - 20 to 5000 millisecond
BATTERY LIFE: 9V Battery; 48 hrs continuous use
TYPICAL USE: 9 mos; Low Batter Indicator
DISPLAY: 5.5 mm (0.2 in.) Liquid Crystal
SIZE: 80 X 147 X 40 mm (3.15 X 5.8 X 1.6 in.)

KVp Meter and Exposure Time Meters

This kVp Meter and Exposure Time Meter directly measure peak kV from the X-ray head. A simple push of the button will display the exposure time. The Model L-815 and Model L-815LR share the same attributes with the exception of range: the Model L-815LR is calibrated to detect a lower range of energy. Both are reliable, battery-operated, easy-to-use, compact, and cost-effective instruments for calculating peak kV (kVp) voltage of tungsten-generated X-ray equipment and also measuring exposure time. Detectors are improved to provide greater range and more stable, repeatable measurements. In addition, an android application has been developed so that the instrument readings can be sent directly to your mobile device's display.

Specifications
RANGE: Model L-815: 45 to 125 kV (Part Number 99-9215)
Model L-815LR: 40 to 115 kV (Part Number 99-9216)
KVP ACCURACY: 2% ± 1 kV at 10 to 50 mA
EXPOSURE TIME ACCURACY: 1% ± 2 milliseconds with minimum 100 millisecond exposure time
MINIMUM EXPOSURE TIME:
High Speed Mode: 40 milliseconds
High Resolution Mode: 80 milliseconds
MINIMUM CURRENT (mA): 7 mA at 50 kV
DISPLAY: 10 cm (0.4 in.), 8-character alphanumeric LCD
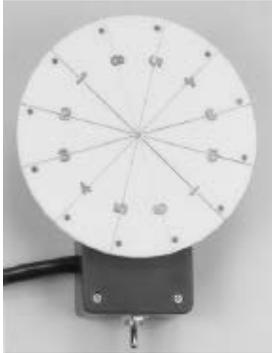POWER: 4 each AA batteries (accessible from bottom of case)
BATTERY LIFE: 48 hr continuous, typically 9 months normal use, low battery indicator
SIZE: 15 x 12 x 5.85 cm (5.9 x 4.7 x 2.3 in.) (L x W x H)
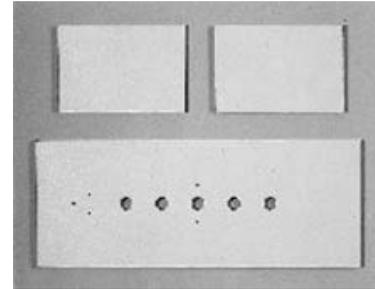WEIGHT: 0.7 kg (1.5 lb)

Diagnostic Test Tools

Model L-629

Part Number: 99-9425

Model L-644

Part Number: 99-9429

Rotating Spoke Test Tool

Introduction

The Ludlum Model L-629 Rotating Spoke Test Tool is designed to evaluate the performance of the fluoroscopic imaging systems. The tool demonstrates screen image lag, motion blur, contrast, and related distortions encountered in fluoroscopic examinations. **

When combined with aluminum or acrylic block attenuators the rotating spoke test tool provides the user with a means to simulate the movement of guide wires and radiopaque catheters, seen in angiography or cardiac catheterization patient procedures.

The rotating spoke test pattern consists of a circular 14 cm (5.5 in.) diameter acrylic disk with steel 12 wires arranged on its surface in 30 degree intervals. The wire diameters range from 0.51 mm (0.02 in.) to 0.127 mm (0.005 in.). There are two wires of each size directly opposite each other on the disk. Lead numbers (1–6) appear on each half of the disk near the perimeter. The disk is mounted on a synchronous motor with a speed of 30 RPM to simulate movement of wires.

The visibility of smaller diameter wires 0.356 mm (0.014 in. or less) will confirm the system performance. [3.56 mm (0.14 in.) is a common guide wire size]

   ** As described in AAPM Rpt. 60

Grid Alignment Test Kit

Introduction

The Ludlum Model L-644 Grid Alignment Test Kit is designed to confirm that the proper centering and height uniformity of a standard or focused grid is correctly aligned with the central axis of the X-ray beam.

The test procedure is simple and requires that the holed test plate is centered to the X-ray table and positioned such that the length of the tool is perpendicular to the direction of the grid lines. One exposure is then made centered over each hole in the test plate. After processing, the film (image) is examined for potential changes in optical density. A properly centered and level grid should provide five equal densities on the test film (image).

Specifications

The test kit includes one plate, 22.9 x 8.9 cm (9 x 3.5 in.), with five test holes. There are also two blocking plates, which measure 8.9 x 6.0 cm (3.5 x 2.4 in.). All three plates are made of 0.16 cm (0.06 in.) thick lead encased in acrylic material for ease of handling.

Diagnostic Test Tools

Model L-301 Table Top Densitometer

Part Number: 99-9600

Model L-331C Portable Densitometer

Part Number: 99-9601

Model L-396 Sensitometer

Part Number: 99-9602

Tools for Processor Quality Assurance

Introduction

The Model L-301 Table Top and Model L-331C Portable Densitometers are easy to use precision instruments designed to provide highly accurate and repeatable (black & white) optical density readings. This makes them an ideal tool for Processor Quality Assurance.

The readings provided by the Model L-310 will alert you to fluctuations in processing conditions and allow you to take the necessary corrective action before film quality becomes an issue. The Model L-301 offers an optional RS-232 interface.

Specifications

Measuring range: 0–5.0 D with 2 and 3 mm apertures; 0–4.0 D with 1 mm aperture

Model L-396 Sensitometer

Introduction

The Model L-396 Sensitometer is a required tool for processor quality assurance. This easy-to-use unit features a 21 step density wedge with 0.15 D increments. The Dual colored (green and blue) light source provides for precise and controlled repeatable exposures. The created film allows for the monitoring of processor variations by comparing the 'control' film to the previously created step wedge. Speed, contrast and base-plus-fog values are collected using the Model 301 or Model 331 densitometer.

Specifications

EXPOSURE STABILITY: ±.02 log exposure per year
UNIT-TO-UNIT REPEATABILITY: ±.02 log exposure
POWER REQUIREMENT: 9 volt alkaline battery (included) approximately 10,000 exposures

Diagnostic Test Tools

Model PMLX Precision Photometer

Introduction

The Model PMLX Precision Photometer is designed to measure both illuminance (the amount of light falling on a surface) in lux (lumens per m^2) and luminance (the amount of light emitted from a surface in 'nit' (candela per m^2).

The Precision Photometer quickly verifies that collimator light sources are in accordance with regulations. It also measures the brightness and uniformity of an X-ray viewbox for appropriate brightness and uniformity.

When used for Mammography Quality Control, the photometer will provide measurement of viewer luminance and room illuminance required by MQSA guidelines.

Either of two optional (rigid or flexible) fiber optic probes can be used to make measurements of SMPTE* patterns produced by digital display units, in order to determine appropriate density and contrast settings for image display monitors.

The battery operated photometer has a bright LED display and only two operating controls: "Measure" for taking readings, and "Range" to adjust the meter display to the light being measured.

Part Number: 99-9700

Specifications

RANGE: 0.1 to 999,000 lux or nits
SIZE: 1.8 x 1.3 x 0.5 cm (4 x 2.8 x 1.2 in.) (H x W x thickness)
WEIGHT: 113 g (4 oz)

Options

Model PM10: Rigid Fiber Optic Probe**   PN: 99-9701
Model PM11: Flexible Fiber Optic Probe** PN: 99-9702
Model PM12: Iluminance Receptor **   PN: 99-9703
Model PM13: Luminance Receptor   PN: 99-9704

* SMPTE: Society of Motion Picture & Television Engineers
** Must be calibrated with meter

Diagnostic Test Tools

Model L-661-662 Collimator / Beam Alignment

Introduction

The Ludlum Model L-661-662 Collimator/ Beam Alignment test tool provides the necessary verification of the proper congruence of the collimator light field and the X-ray beam. Misalignment of the collimator may cause key portions of the image to be missing from the radiographic image.

The beam alignment (cylinder) portion of the test tool confirms that the central ray is perpendicular to the image receptor. Improper beam alignment will cause a distorted radiographic image.

The test tool is easy to use and readily identifies misalignments and improper angulation of the X-ray tube.
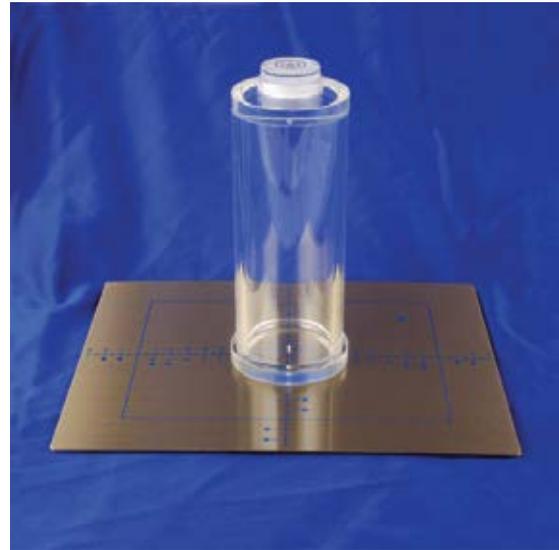
Part Number: 99-9405

Specifications

Collimator Test Plate Specifications
Size: 20.3 x 25.4 cm (8 x 10 in.) (W x L) plate with 14 x 18 cm (14 x 18 in.)
pattern etched onto surface
Weight: 184 g (6.5 oz.)

Beam Alignment Cylinder
Size: 6.4 x 15 cm (2.5 x 5.9 in.) (Dia x L) (outside diameter)
Weight: 0.24 kg (0.54 lb)

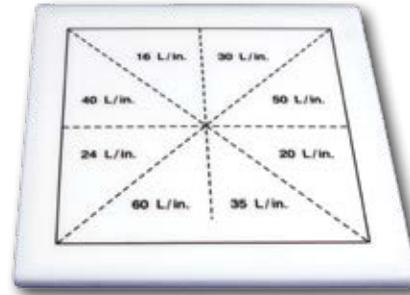# Diagnostic Test Tools

Model L-600
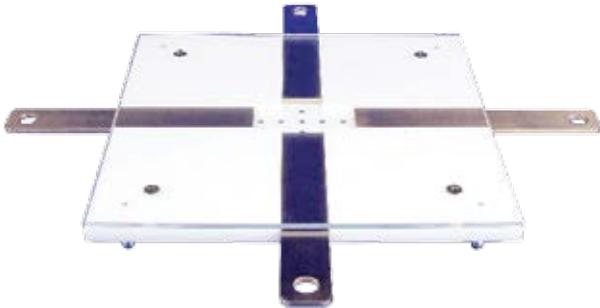
Part Number: 99-9406

Models L-601, 618 & 619

Part Number: See table

Fluoroscopic Alignment Device

Introduction
The Ludlum Fluoroscopic Beam Alignment device consists of an aluminum plate with four sliding brass strips set in recessed channels. The strips define the border or visible area of the image receptor. A plastic overlay prevents any vertical displacement of the brass strips. Holes drilled in half-inch intervals are filled with higher density material for visibility through the brass strips. The device, when placed in the center of the image receptor, is designed to correct or optimize fluoroscopic collimation.

Any portion of the fluoroscopic field that falls outside the image receptor does not contribute to the useful image and can lead to unnecessary exposure to the patient. This very simple but critical measurement will identify a misaligned fluoroscopic system.

Specifications
DIMENSIONS: 22.9 x 22.9 x 1.6 cm (9 x 9 x 0.63 in.)
WEIGHT: 2.3 kg (5 lb)

## Fluoroscopic Resolution Test Tools

Introduction
The Fluoroscopic Resolution Test Tool is a plastic plate containing eight groups of copper and brass mesh screening. Three models are offered, each with different resolutions for standard, medium, and high-resolution ranges covering from 16 up to 150 lines per inch (LPI). (See table below.) The screens are arranged in an irregular and non-sequential rotation to permit better visualization of the different resolution patterns.

These test tools provide a quick check on Image Intensifier or video system resolution.

Model No.	Resolution	Part Number
L-601	20–70 LPI	99-9407
L-618	30–100 LPI	99-9408
L-619	60–150 LPI	99-9409

Diagnostic Test Tools

Model L-777
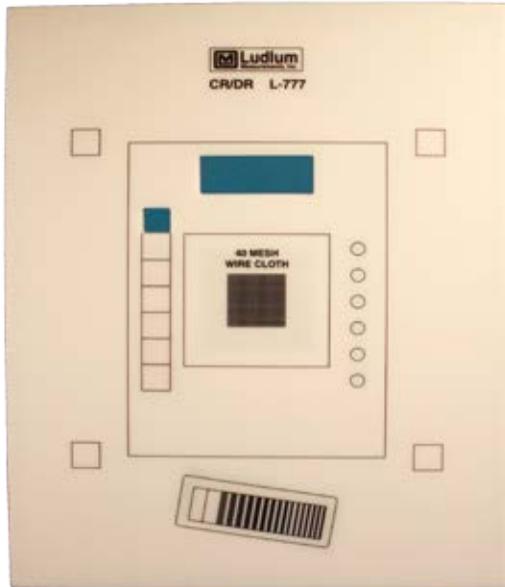
Part Number: 99-9412

CR/DR Test Tool

Introduction
The Ludlum CR/DR Test Tool is designed for the evaluation of the newer filmless digital CR (Computed Radiography) and DR (Digital Radiography) imaging systems.

The CR/DR Test Tool incorporates a variety of testing parameters that, when used daily, tracks geometry (region of interest) symmetry, line pair resolution, as well as low and high contrast performance. Measurements of the various targets allow for evaluation of both the monitor and printed film image. The CR/DR tool will become a valuable asset to the QA technologist and the medical physicist trying to determine the source of an image quality problem or complaint.

The large size, 43.2 x 35.6 cm (17 x 14 in.) (H x W), makes it ideal for quick checks on automated chest systems.
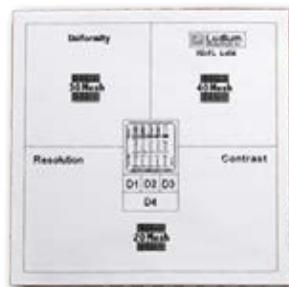
Specifications
SIZE: 43.2 x 35.6 x 1.3 cm (17 x 14 x 0.5 in.) (H x W x D)
WEIGHT: 3.2 kg (7 lb)
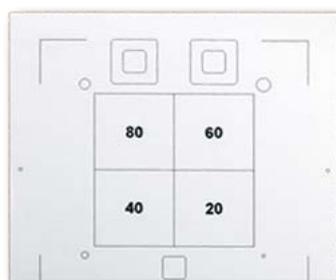Converging Line Pair Test Pattern

Model L-656

Part Number: 99-9411

RD/FL Contrast/Resolution Test Tools

Introduction
The Ludlum RD/FL Phantoms are easy-to-use tools to quickly assess the general radiographic and fluoroscopic image quality and performance of a standard imaging system. The ability to measure contrast and resolution in one exposure allows the QC technologist, service engineer, or medical physicist to quickly determine whether or not the system is working correctly. When used daily, the RD/FL test tools will also easily identify trends that may be an indication of image degradation, typically caused by slight changes in kVp or mAs.

Model L-647

Part Number: 99-9410

RD/FL Contrast/Resolution Test Tool

Introduction
The Ludlum RD/FL Phantoms are an easy-to-use tool to quickly assess the general radiographic and fluoroscopic image quality and performance of a standard imaging system. The ability to measure contrast and resolution in one exposure allows the QC technologist, service engineer, or medical physicist to quickly determine whether or not the system is working correctly.

The Model L-647 phantom has six pie-shaped mesh patterns ranging from 20 to 100 lines per inch. Surrounding the mesh pattern are four low-contrast targets of varying diameters (2 mm, 4 mm, 6 mm and 8 mm).

Diagnostic Test Tools

Model L-777-Mini CR/DR Test Tool

Introduction

The L-777 CR/DR- Mini Test Tool utilizes a variety of testing parameters that track the uniformity, contrast and resolution of the imaging system. This is done by the imaging of a variety of targets within the tool that provide subjective and precise values that are used to monitor the High Contrast, Low Contrast, Gross Resolution, Fine Resolution as well as, general uniformity and general edge sharpness of the imaging system.

The L-777-Mini is used to make a sample image of the approved system. This image is saved and used as a benchmark for future evaluation of the system. Frequency of the future evaluations of the image system are determined by the QA manager. Testing can be performed daily, weekly, or as directed by the medical physicist or quality assurance manager. The more frequent the testing the less likely a negative trend will develop.

When degradation of the imaging system is suspected or following any service to the system, an image of L-777-Mini is done and compared to the original benchmark image. When degradation of the image is suspected, the benchmark image becomes proof of the potential quality of the system and a guide for the service technician, as to the quality expectations required of the system.

Part Number: 99-9458

Specifications

DIMENSIONS: 30.5 x 25.4 x 0.9 cm (12 x 10 x 0.375 in.) (H x W x D)
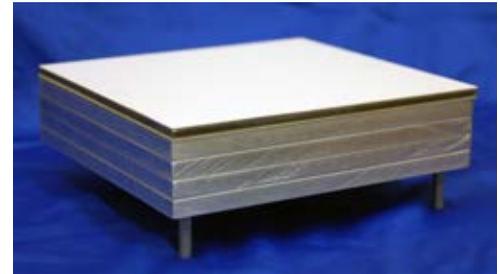WEIGHT: approximately 1.4 kg (3 lb)
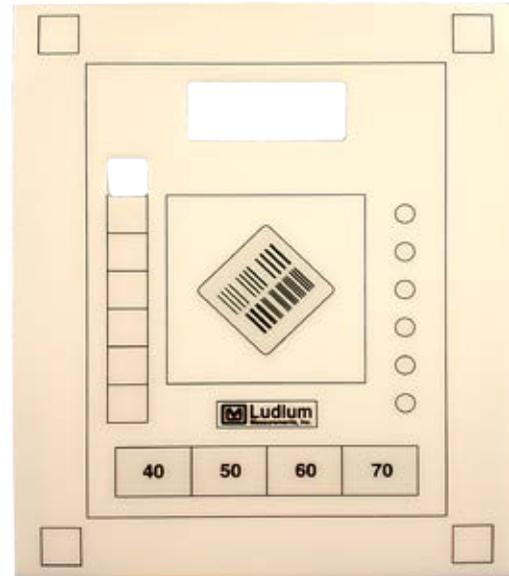
Diagnostic Test Tools

Model L-760

Part Number:
99-9413

Model L-706

Part Number:
99-9430

Acrylic Modular X-ray Phantom

Introduction

The modular Acrylic X-ray Phantom is made up of a series of acrylic and aluminum plates that provide the various attenuation characteristics of various body part thicknesses. Varying the number of acrylic plates and/or spacers can create a simulation of a standard chest, abdomen, skull, or extremity.

The acrylic phantoms conform to AAPM recommendations noted in report # 31 (Standardized Methods for Measuring Diagnostic X-ray Exposure); and also those noted in Report #60 (Instrumentation Requirements for Diagnostic Radiological Physicists).

The Phantom set is also useful for making exposure technique charts for commonly used projections. The latter has been a long standing requirement of the JCAHO (Joint Commission on Accreditation of Health Care Organizations).

These phantoms are ideal for adjusting automatic exposure controls and automatic brightness controls on diagnostic and fluoroscopic systems.

Specifications

The Modular Phantom contains the following components:
    Five Acrylic Sheets: 25 cm x 25 cm x 2.54 cm thick
    One Acrylic Sheet: 25 cm x 25 cm x 5.08 cm thick
    One Aluminum Sheet: 25 cm x 25 cm x 1 mm thick
    One Aluminum Sheet: 25 cm x 25 cm x 2 mm thick
    One Aluminum Sheet: 7 cm x 25 cm x 4.5 mm thick
    Spacers for a 5.08 cm air gap

*Also available separately (Model L-706-C

Patient Penetrometer

Introduction

The Ludlum Model L-706 Patient Penetrometer Kit provides the necessary patient phantom attenuation material to test the exposure rate output of any standard or digital fluoroscopic system. This kit is designed to work with almost all X-ray exposure or multimeter measurement devices.

The aluminum plates are used in combinations to simulate the different masses of a very large adult's abdomen, a child's abdomen, or an adult's chest. Using all four of the plates will represent 26 cm (10.2 in.) of water for the large adult abdomen at 90 Kvp. A child's abdomen or adult chest is simulated by using two of the plates. Each of the four plates is made of high-purity (1100) aluminum. Automatic brightness control at maximum output is evaluated using the lead "stop" plate. This plate is laminated to ensure the safety of the user.

The resolution plate is provided with two sets of holes in opposition to each other. The diameters of the holes are as follows: 0.187, 0.125, 0.0625, 0.032, and 0.016 inches. Typically two of the aluminum plates (two above and two below) are used to measure the contrast gradient of the image systems. Two sets of spacing rods in two sizes are provided to act as spacers from the X-ray source.

Specifications

ALUMINUM PLATES (quantity 4)
    Construction: high-purity (1100) aluminum
    Size: 17.8 x 17.8 cm (7 x 7 in.) (L x W)
LEAD PLATE (quantity 1)
    Construction: lead, laminated
    Size: 17.8 x 17.8 cm (7 x 7 in.) (L x W)
COPPER PLATES (quantity 4)
    Construction: Copper
    Size: 17.8 x 17.8 (7 x 7 in.) (L x W)
RESOLUTION PLATE (quantity 1)
    Hole Diameters: 0.187, 0.125, 0.0625, 0.032, and 0.016 inches
SPACING RODS (quantity 2 sets)
    Size: 2 sizes

Diagnostic Test Tools

Model L-760-LC1 Low Contrast Resolution Plate

Introduction

An optional Low Contrast Resolution Plate, Model L-760-LC1,
is available to evaluate the resolution of digital radiography systems. The plate was intentionally made to the same overall size of the Acrylic Modular X-ray Phantom Kit plates. The Resolution Plate may be used as a 'standalone', but when used with the Acrylic Kit it allows the user to add more attenuation.

The visibility and potential loss of detail associated with the digital imaging of low contrast anatomy, when utilizing film digitizers, imaging plates, and printers as well as digital display monitors, needs to be evaluated in order to assure that a proper diagnosis can be made by the radiologist when utilizing these systems. The Low Contrast Resolution plate offers a method to examine the digital system's ability to detect the smallest and shallowest low contrast targets on the plate.

A weekly comparison of these images enables the user to maintain the standard of quality (benchmark) for the digital images being produced by the system.

Also available without color tint
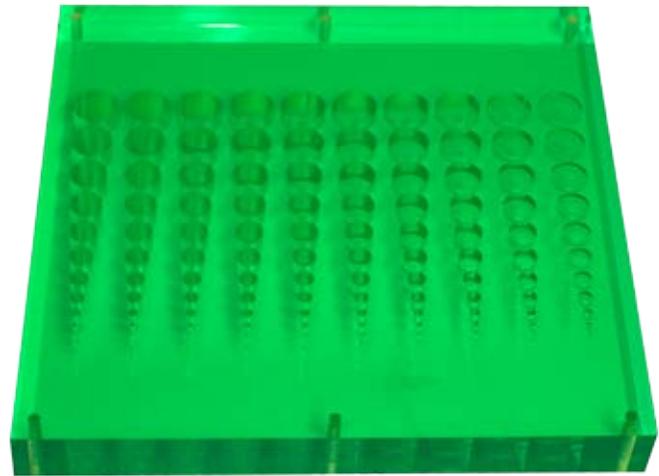
Part Number: 99-9450

Specifications

The Modular Phantom contains the following components:
Five Acrylic Sheets: 25 cm x 25 cm x 2.54 cm thick
One Acrylic Sheet: 25 cm x 25 cm x 5.08 cm thick
One Aluminum Sheet: 25 cm x 25 cm x 1 mm thick
One Aluminum Sheet: 25 cm x 2 cm x 2 mm thick
One Aluminum Sheet: 7 cm x 25 cm x 4.5 mm thick
Spacers for a 5.08 cm air gap

Low Contrast Resolution Plate:
25 cm x 25 cm x 2.54 cm thick
Horizontal Holes change from Left to Right by 2mm diameter
Vertical Holes change from Top to Bottom by 2mm depth.

Model L-610 AAPM CT Performance Phantom

Introduction

The Ludlum CT Performance Phantom is a modular phantom that provides the user with an efficient method to evaluate the performance of the CT scanners. The 'one' phantom allows for testing of a full range of performance parameters such as noise, spatial resolution, low and high contrast, slice thickness, alignment, and linearity. The phantom design is based on the guidelines provided in AAPM Report #1.

The phantom is made up of an acrylic source tank and several resolution inserts. The inserts include a linearity high contrast insert, beam width insert, low contrast insert and a resolution insert, along with an external resolution and noise ring. Additionally, a 20.3 cm (8.0 in.) ID Teflon® ring, positioned at the base of the tank, is designed to simulate bone density.

Note: The External Whole Body Ring is available as an option. Order Model L-610-411, part number: 99-9440.
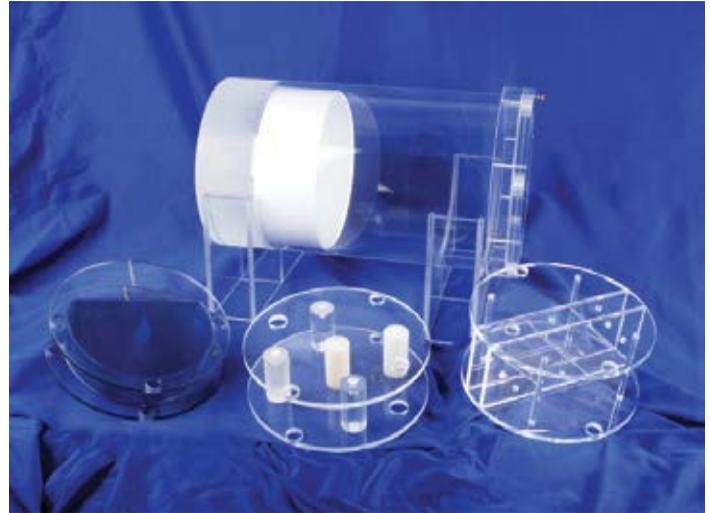
Part Number: 99-9009

Specifications
SOURCE TANK: 21.6 X 20.3 X 32.4 cm (8.5 x 8.0 x 12.75 in.) (OD x ID x L)
LINEARTY / CONTRAST INSERT: 19.1 x 6.4 cm (7.5 x 2.5 in. (OD x L)
RESOLUTION INSERT: 19.1 x 6.4 cm (7.5 x 2.5 in.) (OD x L)
BEAM WIDTH INSERT: 19.1 x 8.9 cm (7.5 x 3.5 in.) (OD x L)
LOW CONTRAST INSERT: 21.6 x 9.5 cm (8.5 x 3.8 in.) (OD x L)
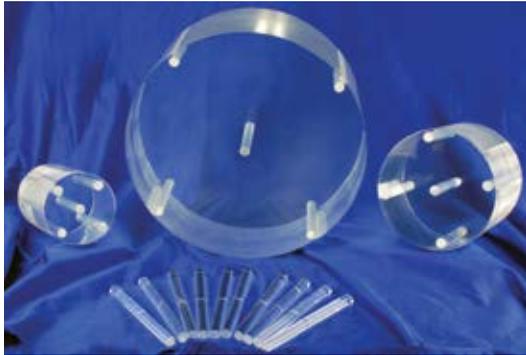OPTIONAL EXTERNAL WHOLE BODY RING: 30.5 x 21.6 x 6.4 cm (12 x 8.5 x 2.5 in. (OD x ID x L)
TEFLON BAND (BONE RING): 20.3 x 0.64 cm (8.0 x 0.25 in.) (ID x Thickness)
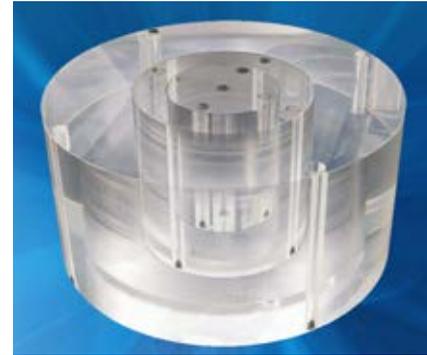WEIGHT: 7.8 kg (17.3 lb)

Options

Model L-610CS Case PN 99-9414-01

CT/MRI Phantoms

Model L-007CT

Part Number:
99-9418

Model L-007N (Nested)

Part Number:
99-9017

CT Head/Body/Pediatric CTDI Phantom

Introduction

The Ludlum CT Head/Body/Pediatric CTDI (Computed Tomography Dose Index) Phantom, in combination with a specialized CT-Ion chamber, provides a means of determining the approximate dose to the patient for a given series of scans. The CT Head/Body (and Pediatric) phantoms are designed in accordance with the FDA standard (21 CFR 1020.33) for diagnostic X-ray units, specifically as applied to CT systems. The CTDI sets are available in standard or nested configurations.

These phantoms can be used with any CT system and may be used to image and monitor adult head and body as well as pediatric dose requirements. The phantom sets consist of a group of head, body and pediatric acrylic sections with five probe holes in each section. Acrylic rods are provided to seal the unused holes.
Phantom also available in L-007N-2 (Head / Body only) format

Specifications
L-007CT WEIGHT: 20.4 kg (45 lb) for complete set
      Model L-441: 3.6 kg (8 lb)
      Model L-451: 14.5 kg (32 lb)
      Model L-491: 2.3 kg (5 lb)
L-007N WEIGHT: 15.9 kg (35 lb)

Model L-007CT Components
Model L-441 Head CTDI Phantom (Part Number 99-9415)
Model L-451 Body CTDI Phantom (Part Number 99-9416)
Model L-491 Pediatric CTDI Phantom (Part Number 99-9417)
Model L-007CT Complete CTDI Set (Part Number 99-9418)

Options
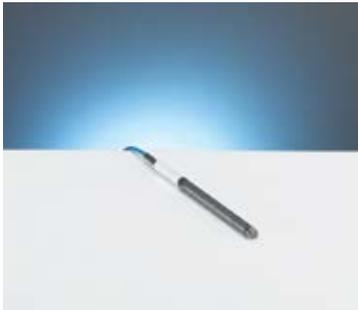Model L-007N Complete Set of Nested CT Phantoms Part Number 99-9017
Model L-007N-2 Nested Phantom Head & Body Only Part Number 99-9439
Model L-007 Set of 5 Replacement Rods for either Nested or Separate CT Phantom Part Number 99-9452
Model L-007CS Large Case for Separate Head, Body, Pediatric Phantoms Part Number 99-9018-01

CT/MRI Phantoms

Model L-3009

Part Number: 99-9203

CT Ion Chamber

Introduction
The Model L-3009 CT (pencil-type) Ion Chamber has a sensitive length of 10 cm and is designed for use with the Ludlum CTDI Phantom. (PN 99-9418)

Specifications
Chamber Volume: 3.14 cc
Wall Material: PMMA, graphite coated
Electrode Material: Aluminum
Nominal Response: 14 nC/Gy
Complies with: IEC 61674

Therapy Ion Chamber Options
L-30013 Waterproof Farmer Chamber, PN: 99-9431
L-30011 Graphite Non-Waterproof Chamber, PN: 99-9209
L-30010 Aluminum Standard Farmer Chamber, PN: 99-9210
L-26002 1.00-6 Extension BNC Cable, PN: 99-9211

Model L-110

Part Number: 99-9205

Diagnostic Electrometer

Introduction
The lightweight compact Model L-110 Diagnostic Electrometer is designed for acceptance tests and routine measurements in diagnostic radiology. It measures dose, dose rate, dose length product, and irradiation time. The Model L-110 is ideally suited for CTDI dose measurements.

Also available is the highly sensitive, full-feature Model L-120 Electrometer, suitable for Diagnostic and Therapy measurements.

Specifications
Meets requirements noted in IEC 61674
RESOLUTION: 1fA
ENERGY DEPENDENCE: less than ± 5%
REPRODUCABILITY: less than ± 0.5%
AVAILABLE CONNECTORS: BNT, TNC and M
AVAILABLE OPTION: Model L-16018 (100 v) Ion chamber Adapter

Options
Model L-6004 Rad/Flouro Detector 40–150 kV: PN: 99-9206
Model L-6005 Mamm Detector, 25–45 kV PN: 99-9207

Model L-6004 & L-6005
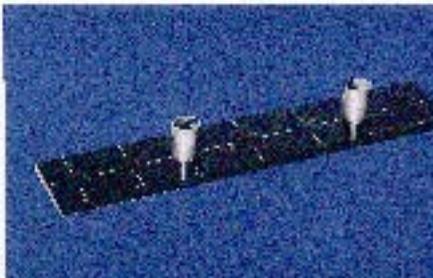
Ultrasound Phantoms

Model L-840

Part Number: 99-9434

Model L-855

Part Number: 99-9110

Model L-829

Part Number: 99-9453

Introduction / Specifications

Dual Source Scatter Phantom

The Model L-840 simulates in-vivo scatter conditions required to measure gamma camera deadtime. Deadtime is the interval in which a gamma camera, while processing incident radiation, is insensitive to additional radiation. Measurement of this phenomena is important because, during higher count rates, losses of data during the 'deadtime' degrade the quantitative data. Accurate measurement allows for the mathematical correction of the deadtime losses.

The Model L-855 Thyroid /Neck Phantom

has for many years been an accepted standard recommended by the American National Standards Institute for thyroid radio-iodine uptake measurements.

Thyroid/ Neck Phantom Specifications:

DIMENSIONS: 12.7 x 12.7 cm (5 x 5 in)(H x D)
WEIGHT: 2 kg (4.5 lb)

The Pixel Calibration Phantom has seven source locations, with the distance between source locations accurately determined. These distances range from 70 to 440 mm. Two lead source holders, each with a 1.5 mm hole located in the center, are included with the phantom
DIMENSIONS: 10.2 x 50.8 cm (4 x 20 in.) (W x D)
WEIGHT: 1.15 kg (2.54 lb)

Thyroid Counting System

Model THY-2244-11

Introduction

The counting system includes our Model 2200 Single Channel Analyzer with 6-Decade Scaler (0–999,999 counts) and a built-in Ratemeter with a range of (0–500,000 counts). The unit also includes an adjustable 'window' setting and has a 120 hour Battery Back-up and an RS-232 Output capability.

The Model L-16A051-626 Collimator holder is designed specifically to hold the included Model 44-11, 5.1 x 5.1 cm (2 x2 in.) NaI Integral Gamma Scintillator for improved resolution which provides improved resolution due to the geometric position of the crystal within the detector.

Ludlum Benchtop Thyroid Counting System

Part Number: 48-3786

Model 44-11 Specifications

ENERGY RESPONSE: energy dependent
OPERATING VOLTAGE: typically 500-1200 volts
CONSTRUCTION: integral-line
SCINTILLATOR: 5.1 x 5.1 cm (2 x 2 in.) (Dia x L)
SENSITIVITY: typically 900 cpm/μR/hr (137Cs gamma)
SUGGESTED INSTRUMENTS: SCA, MCA
SIZE: 6.4 x 26.7 cm (2.5 x 10.5 in.) (Dia x L)
WEIGHT: 0.6 kg (1.4 lb)
BACKGROUND: 9750 cpm
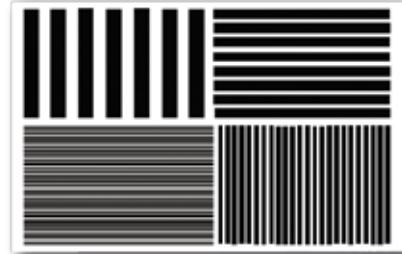PHOTOMULTIPLIER TUBE: 5.1 cm (2 in.) diameter

Nuclear Medicine Phantoms & Accessories

Model L-823 with L-824 & L-825

Part Number: See table

Model L-820

Part Number: 99-9423

PET/SPEC Performance Phantom

Introduction

The Ludlum PET/SPECT Performance Phantom is designed to measure resolution, linearity, and the uniformity of PET (Positron Emission Tomography) and SPECT (Single Photon Emission Computed Tomography) systems.

The Model L-823 source tank is the basic component of this phantom. When combined with the source tank, the Model L-824 Resolution Insert set, and the Model L-825 Cardiac Insert, the PET/SPECT performance phantom provides the user with a comprehensive test tool. The phantom can be filled with a ^{99m}Tc or ^{201}Tl and water solution to simulate cold and hot lesions and for measuring linearity and uniformity performance of the PET/SPECT system.

Specifications

SOURCE TANK: 21.6 x 20.3 x 30.5 cm (8.5 x 8 x 12 in.) (OD x ID x L)
LINEARITY/UNIFORMITY: 19.1 x 5.1 cm (7.5 x 2 in.) (OD x ID)
COLD LESION: 19.1 x 7.6 cm (7.5 x 3 in.) (OD x ID)
HOT LESION: 19.1 x 6.5 cm (7.5 x 2.5 in.) (OD x ID)
CARDIAC INSERT: 25.4 x 20.3 x 15.2 cm (10 x 8 x 6 in.) (H x W x L)
SOURCE TANK/INSERTS WEIGHT: 6.8 kg (15 lb)
MATERIAL: acrylic; sections are sealed with "O" rings for leak-proof assembly

Model	Description	Part Number
L-823	Source Tank	99-9419
L-824	Resolution Inserts	99-9420
L-825	Cardiac Inserts	99-9421

Gamma Camera Bar Phantom

Introduction

The Model L-820 and L-890 are ideal for daily/weekly QA checks of scintillation camera performance. The Bar and Test Pattern Phantoms measure intrinsic and collimator spatial resolution (ability to see small objects), and spatial linearity (ability to correctly position image data) confirming the gamma camera's overall ability to identify and properly display small anatomic objects.

Each of the sets of parallel lines is precisely machined onto a plastic sheet. The lines are filled (cast) with Cerrobend® high-density metal alloy. This causes the gamma radiation to be attenuated, thereby providing the QA image.

The Phantoms are easy to use and satisfy most regulatory quality control requirements for intrinsic resolution. By checking the gamma camera's resolution on a routine basis with either of these phantoms, it will be possible to make quick adjustments to insure the consistent quality of the images being taken from the data that is collected.

Specifications
Bar Phantoms are available in Standard or Large
BAR WIDTHS: 2.5 mm; 6.4 mm; 4.8 mm; 9.5 mm (1/10 in.; 1/4 in.; 3/16 in.; 3/8 in.)
SIZE: Standard: 40.6 X 40.6 cm (16 x 16 in.)
Large 45.7 x 45.7 cm (18 x 18 in.)
WEIGHT: Standard: 5.4 kg (12 lb)
Large: 6.8 kg (15 lb)
Pattern Phantom Specifications:
SIZE: 50.8 x 50.8 x 0.95 cm (20 x 20 x 0.30 [3/8] in.)
WEIGHT: 10.9 kg (24 lb)

Nuclear Medicine Phantoms & Accessories

Model 2200

Part Number: 48-1651

Model 243

Part Number: 47-1621

Model 2200 Scaler/Ratemeter - Wipe Test Counter

Introduction

The Ludlum Model 2200 Scaler/ Ratemeter is the ideal economic solution for routine sample counting, single channel analyzing and routine radiopharmaceutical related procedures, when used with the Model 243 well scintillator (NaTl) detector. The Well Counter's 4π geometry and thick shielding provides excellent sensitivity to higher energy isotopes like ^{131}I.

Two independently adjustable discriminators allow the user to set an energy window to count pulses within a user specified energy range. This portable unit can be powered by wall current or by four D-Cell batteries. The latter allows for continued operations during power interruptions. An optional printer is available for hardcopy archival of wipe test results.

Specifications

Model 2200, Scaler/Ratemeter

SCALER: six-digit LED display providing a range of 0–999999 counts
SCALER LINEARITY: reading within 2% of true value
TIMER: push-wheel adjustment from 0–999 minutes with selectable x0.1 and x1 multipliers
RATEMETER: 0–500,000 cpm total range
METER DIAL: 0–500 cpm, 0–2.5 kV, BAT TEST
MULTIPLIERS: x1, x10, x100, x1000
RATEMETER LINEARITY: reading within 10% of true value
RESPONSE: toggle switch for FAST (4 seconds) or SLOW (22 seconds), from 10% to 90% of final reading
ZERO: pushbutton to zero meter
HIGH VOLTAGE: adjustable from 200–2500 volts (will support 60-megohm scintillation loads)
THRESHOLD: adjustable from 1.00–10.00
WINDOW: adjustable from 0 to 10.0 above the threshold setting (can be enabled or disabled)
DISCRIMINATOR: adjustable from 2–100 mV at threshold setting of 1.00
RS-232: 9-pin connector allowing for printer or computer interface
METER: 6.4 cm (2.5 in.) arc, 1 mA movement analog type
POWER: 95–250 Vac, 50–60 Hz or 4 "D" cell batteries
BATTERY LIFE: typically 120 hours with alkaline batteries (battery condition can be checked on meter)
SIZE: 21.6 x 12.7 x 21.6 cm (8.5 x 5 x 8.5 in.) (H x W x L), excluding handle
WEIGHT: 3.4 kg (7.5 lb), including battery

Options
Printer PN 4167-386
Lead Shield 1.27 cm (0.5 in.) PN: 7379-044

Model 243, Well

DETECTOR: 4.5 x 5.1 cm (1.8 x 2 in.) (Dia x L) integral NaI(Tl) well scintillator
WELL: 1.7 cm x 3.9 cm (0.7 x 1.6 in.) (Dia x L)
EFFICIENCY (4π): 65% for ^{129}I, 90% for ^{99m}Tc, 33% for ^{137}C, 43% for ^{60}Co
OPERATING VOLTAGE: 500 to 1200 volts
SENSITIVITY: will detect 0.005 µCi gamma or 200 dpm removable contamination for ^{99}Tc, ^{131}I, ^{201}Tl, ^{111}In, ^{125}I, ^{137}Cs, and ^{67}Ga
CONSTRUCTION: 1.3 cm (0.5 in.) thick painted lead wall and removable cap
BACKGROUND: 1000 cpm or less (optional 1.3 cm [0.5 in.] lead sleeve for background reduction: Part No. 7379-004)
PHOTOMULTIPLIER TUBE: 5.1 cm (2 in.) diameter
SIZE: 27.9 x 20.3 x 20.3 cm (11 x 8 x 8 in.) (H x W x L)
WEIGHT: 13.6 kg (30 lb)
SHIPPING WEIGHT: 20.9 kg (46 lb)

Decontamination Products

L-Decontamination Kit

Introduction

The Ludlum Decontamination Kit contains the essential equipment, labeling materials, protective clothing, decontamination solvents and cleaning supplies, needed to deal with a basic radioactive spill or routine decontamination problem that may be encountered in the Nuclear Medicine Department or radiologic research laboratory. The 30 gallon drum serves both as a container for the kit components as well as a waste transfer and temporary storage (decay) vessel.

Standard Kit Components

- 1   30 Gallon Drum (hazmat rated)
- 2   each Disposable Coverall and Shoe Covers
- 2   each N-95 Mask
- 2   pairs Disposable Gloves
- 1   Radiacwash Spray 1 liter (optional)
- 1   Box Radiacwash Towlettes (100/box)
- 10 each 30 Gallon Trash Bags
- 1   each 1 in. Crucible Tongs
- 2   each Mop Heads
- 1   each Mop Handle
- 1   Plastic (3 gallon) Pail
- 1   Scrub Brush (6 in.)
- 1   Roll (3 in. x 1000 ft) "Caution Rad Area" Barricade Tape
- 2   each Laminated (7 in. x 10 in.) "Radioactive Material" Sign
- 3   each Vinyl (5 in. x 7 in.) "Radioactive Material" Labels
- 1   Roll Absorbent Paper Towels

Part Number 4525-561

Options

- L-Decon-2 (Deluxe Kit - Part Number: 4525-562) which includes: DeCon Gel and additional Coveralls, Gloves and Shoe Covers
- DeCon Gel / Spray Bottle, 1 liter Bottle - Part Number 03-5648

Shielding Products

Model L-929-91

Part Number: 99-9300

Syringe Carrier

Introduction
The Model L-929-91 Syringe Carrier is constructed of stainless steel with all-enclosed 3.2 mm (0.13 in.) lead shielding completely enclosed between inner and outer walls. It is designed to safely contain syringes, vials, and ampules up to 22.9 cm (9 in.) length. The device may be used for storage and transport. The lid opens 180° for accessibility, overlaps for security, and has a latch to prevent streaming.

Specifications
OUTSIDE DIMENSIONS: 6.4 X 6.9 X 24.4 cm (2.5 x 2.7 x 9.6 in.) (H x W x L)
INSIDE DIMENSIONS: 5.1 x 5.1 x 22.9 cm (2 x 2 x 9 in.) (H x W x L)
WEIGHT: 3.6 kg (8 lb)

Model L-929-10

Part Number: 99-9301

Syringe Holder/Pig

Introduction
The 1.3 cm (0.5 in.) lead Shielded Syringe Holder/Pig will accommodate unshielded, isotope-containing syringes ranging from 1 cc to 20 cc. The unit offers 1.3 cm (0.5 in.) of lead shielding. The extra wide base prevents accidental tipping.

Specifications
OUTSIDE DIMENSIONS: 16.5 x 9.8 cm (6.5 x 3.9 in.) (H x W)
INSIDE DIMENSIONS: 14.3 x 2 cm (5.6 x 0.8 in.) (W x D)
WEIGHT: 2.7 kg (6 lb)

Model L-929-47

Part Number: 99-9302

Introduction
The Lead Lined Waste Container is ideal for storing syringes or other items that have been contaminated with low level energy gamma residue. The 0.32 cm (0.13 or 1/8 in.) lead shielding allows contaminated items to be stored until they are properly decayed.

Specifications
SIZE: 12.7 x 16.5 cm (5 x 6.5 in.) (Dia x H)
WEIGHT: 3.2 kg (7 lb)

Shielding Products

Model L-929-50

Part Number: 99-9303

Model L-PB1218-15B

Part Number: 99-9500

Decay Drum

Introduction

The Decay Drum is designed to store a variety of low-level gamma contaminated materials until the material is appropriately decayed for normal disposal. The inside of the drum is sealed (no exposed lead) to prevent any leakage of radioactive material between the drum and its lead lining. A 17.8 x 7.6 cm (7 x 3 in.) sliding door has been added to the cover to allow for quick access. Two drums are typically used in rotation to allow one for current use and the other for longer term decay.

Specifications

LEAD WALLS: 3.2 mm (0.13 or 1/8 in.) Thick
FINISH: polyurethane enamel paint
UNDER COUNTER CLEARANCE: 88.9 cm (35 in.)
OVERALL SIZE: 55.9 x 85.1 cm (22 x 33.5 in.) (Dia x H)
WEIGHT: 72.6 kg (160 lb)

Clear-Pb® Gamma Shield

Introduction

The CLEAR-Pb® Gamma Benchtop shield provides protection from exposure while working with and handling nuclear medicine isotopes. The CLEAR-Pb® material is made from an acrylic copolymer resin into which lead is chemically introduced as an organic salt compound. The material contains 30% lead by weight. Its physical properties are similar to those of acrylic resins.

Specifications

DIMENSIONS: 45.7 x 30.5 cm (18 x 12 in.) (H x W), 1.5 mm lead equivalent
WEIGHT: 11.3 kg (25 lb)

Optional Lead Equivalents

L-PB1218-05B: 0.5 mm lead equivalent
L-PB1218-20B: 2.0 lead equivalent

Shielding Products

Model L-PB2430-05M

Part Number: 99-9502

Standard Mobile Radiation Shield

Introduction
The Model L-PB2430-05M Mobile Radiation Shield provides excellent protection while offering a wide field of view. The clear portion of the shield if made of CLEAR-Pb® leaded acrylic and provides a 0.5 mm lead equivalent shielding value. The opaque portion of the shield is made of a phenolic material, and the frames are stainless steel. The shields are easily locked into position. The opaque part of the shield is 0.8 mm Pb equivalent.

Specifications
OVERALL SIZE: 190.5 x 76.2 cm (75 x 30 in.) (H x W)
FIELD OF VIEW: 60.9 x 76.2 cm (24 x 30 in.) (H x W)
SHIPPING WEIGHT: 85.3 kg (188 lb)

The Pb shield is also available in 1.0 and 1.5 mm lead equivalent models.

Model L-PB4830-05M

Part Number: 99-9503

Large View Mobile Radiation Shield

Introduction
The Model L-PB4830-05M Large View Mobile Radiation Shield offers a full field of view. The clear portion of the shield is made of CLEAR-Pb® leaded acrylic and provides a 0.5 mm lead equivalent shielding value. The opaque portion of the shield is made of a phenolic material, and the frames are stainless steel. The shields are easily locked into position. The opaque part of the shield is 0.8 mm Pb equivalent.

Specifications
OVERALL SIZE: 190.5 x 76.2 cm (75 x 30 in.) (H x W)
FIELD OF VIEW: 122 x 76.2 cm (48 x 30 in.) (H x W)
WEIGHT: 86.6 kg (191 lb)

The Pb Shield is also available in 1.0 and 1.5 mm lead equivalent models.

LUDLUM
MEDICAL PHYSICS

Shielding Products

Model L-PB Series

Introduction

CLEAR-Pb® Shielding has a variety of applications and can be used for Modular X-ray Room Control Booth, Exam Room Windows, as well as for Table-top and Mobile type radiation barriers. See the Shielding sections of this catalog for more information on the Mobile and Table-top Shields.

The CLEAR-Pb® material is made of an acrylic copolymer resin into which lead is chemically introduced as an organic salt compound. The material typically contains 30% lead by weight. Its physical properties are similar to those of acrylic resins.

Lead Acrylic Shielding

CLEAR-Pb® is available in various sizes and thickness, see table below. Consult Price List for more choices.

Field of View Inches	0.5 mm Pb (12 mm thick)	1.0 mm Pb (22 mm thick)	1.5 mm Pb (35 mm thick)	2.0 mm Pb (64 mm thick)
12 x 12	L-PB1212-05	L-PB1212-10	L-PB1212-15	L-PB1212-20
12 x 24	L-PB1224-05	L-PB1224-10	L-PB1224-15	L-PB1224-20
18 x 24	L-PB1824-05	L-PB1824-10	L-PB1824-15	L-PB1824-20*
18 x 48	L-PB1848-05	L-PB1848-10	L-PB1848-15	L-PB1848-20*
24 x 24	L-PB2424-05	L-PB2424-10	L-PB2424-15	L-PB2424-20
24 x 30	L-PB2430-05	L-PB2430-10	L-PB2430-15	L-PB2430-20*
24 x 36	L-PB2436-05	L-PB2436-10	L-PB2436-15	L-PB2436-20*
24 x 48	L-PB2448-05	L-PB2448-10	L-PB2448-15	L-PB2448-20
36 x 48	L-PB3648-05	L-PB3648-10	L-PB3648-15	L-PB3648-20
36 x 60	L-PB3660-05	L-PB3660-10	L-PB3660-15	L-PB3660-20*
36 x 72	L-PB3672-05	L-PB3672-10	L-PB3672-15	L-PB3672-20*
36 x 84	L-PB3684-05	L-PB3684-10	L-PB3684-15	L-PB3684-20
48 x 48	L-PB4848-05	L-PB4848-10	L-PB4848-15	L-PB4848-20
48 x 60	L-PB4860-05	L-PB4860-10	L-PB4860-15	L-PB4860-20*
48 x 72	L-PB4872-05	L-PB4872-10	L-PB4872-15	L-PB4872-20*
48 x 84	L-PB4884-05	L-PB4884-10	L-PB4884-15	L-PB4884-20*
48 x 96	L-PB4896-05	L-PB4896-10	L-PB4896-15	L-PB4896-20
72 x 96	L-PB7296-05	L-PB7296-10	L-PB7296-15	L-PB7296-20*

* Special Order Only

Shielding Products

Ludlum Lead Lined Nuclear Medicine Work Station - Model L-995-037

Introduction

The all-in-one Nuclear Medicine Work Station has a stainless steel work surface with a 12.7 cm (5 in.) backsplash, plus a 1.3 cm (0.5 in.) beveled edge on the other three sides to prevent spills from draining off the top. The vertical supports of the cabinet are steel and filled with lead. There is a 10.2 cm (4 in.) diameter chute to dispose of used syringes into a sharps container (plastic container not included) that sits on a sliding pull-out shelf in the cabinet. The chute has a stainless steel encased 1.3 cm (0.5 in.) lead cover.

The cabinet includes a well for the dose calibrator well chamber. There is also an attached L-Block made of 1.3 cm (0.5 in.) lead encased with steel and a steel framework around the 1.3 cm (0.5 in.) thick leaded glass. The unit sits on four 7.6 cm (3 in.) high adjustable leveling legs.

The two stainless steel shelves are height adjustable and have a 1.6 cm (0.63 in.) spill lip on all four sides. Bottom surfaces inside the cabinets are also stainless steel. The front doors open 180 degrees from the center. Both doors are lead encased in steel, with key-lock L-handles, and a 2.2 cm (0.88 in.) overlap.

Part Number: 99-9304
(shown with optional side shields)

As shown above, three optional side shields are available for the top of the cabinet. The shields, Part Number L-995-037S, are 1.3 cm (0.5 in.) lead covered with stainless steel and fit into "L" brackets with two vertical corner gussets.

Specifications

CABINET DIMENSIONS

OVERALL SIZE: 91.8 x 91.4 x 76.2 cm (36.1 x 36 x 30 in.) (H x W x D) work surface, 104 cm (41.1 in.) to top of backsplash
CABINET OPENINGS: 62.2 x 36.2 cm (24.5 x 14.3 in.) (H x W)

SHELF SIZES

SHARPS CONTAINER SHELF: 0.9 x 14 x 21.6 cm (0.94 x 5.5 x 8.5 in.) (H x W x D)
LARGE PULLOUT SHELF: 1.6 x 31.1 x 64.1 cm (0.63 x 12.3 x 25.3 in.) (H x W x D)
LARGE FIXED SHELF: 1.6 x 34.9 x 64.1 cm (0.63 x 13.8 x 25.3 in.) (H x W x D)
WELL FOR DOSE CALIBRATOR: 20.3 x 24.1 cm (8 x 9.5 in.) (Dia x D)

L-Block Dimensions

FRONT of L-BLOCK: 48.3 x 36.2 x 0.19 cm (19 x 14.3 x 0.075 in.) (H x W x thickness)
OVERALL HEIGHT of L-BLOCK: 72.4 cm (28.5 in.)
WINDOW ANGLE: 45°
WINDOW VIEWING AREA: 30.5 x 33 cm (12 x 13 in.) (H x W)

OPTIONAL SIDE SHIELDS

Side shields (Part Number L-995-037S) are available for the top of the cabinet to minimize contamination. The shields are 1.3 cm (0.5 in.) of lead covered with stainless steel, and fit into "L" brackets with two vertical corner gussets.
SIZE: 69.9 x 47 x 1.9 cm (27.5 x 18.5 x 0.75 in.) (D x H x thickness) with 1.3 cm (0.5 in.) lead covered with stainless steel

Custom Hot Labs

Model NM-1 Custom Hot Lab Package(s)
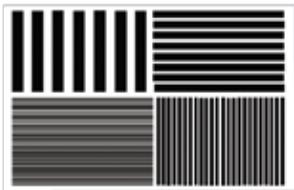
The Ludlum Custom Hot Lab Package is designed to provide you with the Hot Lab equipment and accessories needed to start and operate a Nuclear Medicine facility. Whether you require only a few instruments and products, or a complete radiation monitoring, QA, shielding and lead lined cabinetry set up, we can provide the package that will best meet your needs.

Please contact your Ludlum representative for any questions regarding your required list of products and services.

Catalog Index by Product Model Number

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