

*Radiation Detection
for a Safer World*

**HEALTH
PHYSICS**



 **Ludlum**
Measurements, Inc.

www.ludlums.com

Ludlum Measurements, Inc.

Radiation Detection for a Safer World

Introduction

Ludlum Measurements, Inc. (LMI) has been designing, manufacturing, and supplying radiation detection and measurement equipment in response to the world's need for greater safety since 1962. Throughout its nearly five-decade history, LMI has developed radiation detection technologies and instruments in support of enhancing the safety of personnel and the environment. It offers one of the largest lines of radiation detection instrumentation available from any one company.



Longevity and Commitment

LMI's earned reputation for affordability, high quality, reliability, durability, and long-term support are well known and highly respected within each of the markets it currently serves. The core values established by its founder and president, Mr. Don Ludlum, continue in full force, without interruption or alteration by outside investors or buyers. Mr. Ludlum and his son, Larry, remain at the helm of the company, which has grown into a full-scale enterprise operated by a staff of highly experienced professionals.

Totally Integrated

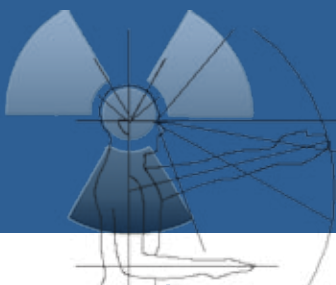
LMI has invested heavily into becoming a vertically integrated radiation detection company in order to better control costs, quality, and delivery times. Over the years Ludlum has implemented a very comprehensive machine shop, welding capabilities, environmentally-controlled painting facilities, and numerous assembly lines. Recent additions of in-house, automated PC board assembly, plastic injection molding capability, photomultiplier tube, and plastic scintillation detector design and manufacturing all contribute to this succeeding philosophy.

Engineering Excellence

LMI has a significant investment in engineering to ensure it sustains a high level of competency and excellence within the organization. The width and breadth of the engineering organization affords it to rapidly develop many new designs each year, including custom designed solutions while simultaneously supporting its large product line. Many of the time-tested and field-proven designs are credited to LMI's engineering expertise in developing reliable instruments capable of withstanding rough handling and harsh environments.

Legendary Support

LMI is also legendary for its repair, calibrations, and training support. It still supports instruments shipped several decades previously, well past what most traditional instrument companies would deem reasonable. LMI additionally supports calibration and repair on many radiation detection instruments manufactured by others.



Catalog Info

www.ludlumms.com

INDEX

New Products	4
Placing an Order	7
Warranty	7
GM Survey Meters	8
Ion Chamber Survey Meters	10
microR Survey Meters	11
Neutron Survey Meters	12
Intrinsically Safe Survey Meters	13
Specialty Survey Meters	14
Isotopic Identifier Survey Meters	15
General Purpose Meters	
- Ratemeters	16
- Scaler/Ratemeters	18
- Data Loggers	19
- Benchtop Meters	20
Radiation Detectors	
- Alpha	21
- Alpha/Beta	24
- Alpha-Beta-Gamma	24
- Beta	23
- Beta-Gamma	25
- Gamma	22
- Neutron	23
Sample Counting Systems	26
Sample Counting System Components	28
Sample Planchets	27
Contamination Monitor Systems	30
Area Monitors	32
Emergency Response Instruments	34
Waste Monitors	36
Dosimetry	38
Test Equipment	41
Check Sources & Holders	41
Accessories	42
Support Services	46
Model Number Index	47

New Products



53

Personnel Portal Monitor

Personnel Portal Monitor

Ludlum has totally redesigned its Model 53 Portal monitor to include the latest state-of-the-art algorithms and technologies.

Features include:

- Employs 8 large plastic scintillation detectors
- Shielded with either the standard 2.5 cm (1 in.) or optional 5 cm (2 in.) of lead
- Automated voice prompts guide personnel through (customized to any language)
- Choice of three counting modes and three operational modes
- Supplies multiple USB Ports
- Ethernet connectivity

Read more on page 31.



54

Small Article Monitor

Small Article Contamination Checking

The Model 54 is an all new design incorporating best practices employed over the past couple of decades.

This monitor features:

- True 4π counting geometry for optimized homogenous efficiency
- QPASS counting technology for shorter counting cycles
- Large color LCD with touch-screen interface
- USB port for printer-free operation & calibration
- User-selectable operating modes
- Auto calibration routine

Read more on page 31.



2100-Series
Sample Counter

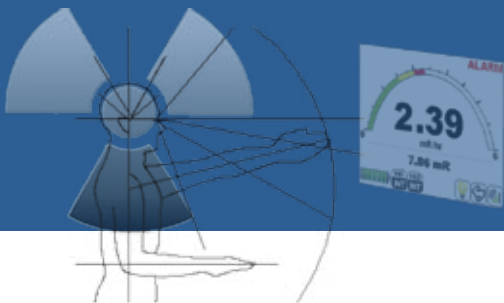
Sample Counter

The Model 2100 system is an automated gamma sample counter designed to check steel slug samples. It incorporates a lead-shielded NaI(Tl) detector, conveyor, and controller to facilitate a fully automated process. A backlit, color LCD touch screen presents the results and allows configuring the system parameters. The unit includes an Ethernet port for real-time reporting and 2 USB ports for connecting external ID input devices. The monitoring process is fully automated. Once a sample is loaded onto the inlet conveyor, built-in sensors automatically activate the conveyor which delivers the sample to the detector system.

Ludlum also offers a Model 2100-1 system that replaces the conveyor with a slide-out drawer for operators to manually insert the slug samples.

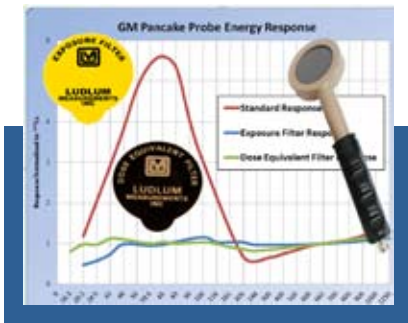
Read more on page 27.

New Products



Model 44-9 Detector Correction Filters for Exposure & Dose

Due to the well known over-response of GM pancake probes to varying energies, they are best suited for measuring contamination in units of counts. To expand their utilization, Ludlum has created two filters; one for exposure, and a second for ambient dose equivalent measurements that flattens the energy response to $\pm 20\%$. These filters simply snap into place across the detector face of Ludlum's popular Model 44-9 GM pancake probe. The filters can be purchased separately to retrofit existing probes or together with a new Model 44-9 as indicated in the table below.



Description	Part Number
44-9 Exposure Filter Kit (includes filter & grill)	4002-1066
44-9 Dose Filter	2002-1050
Model 44-9EXP (probe with filter kit installed)	47-3788
Model 44-9DOSE (probe with filter)	47-3789



Pressurized Ion Chamber

This instrument is built on Ludlum's new Dimension platform, offering convenient PC connectivity, a programmable color LCD display, and simple operator interface.

Features include:

- 0-5 R/hr range
- Sunlight readable color display
- Auto zeroing and ranging
- Alarming capability
- Rate, integrate, and peak hold readouts
- Data logging
- USB connectivity
- Free firmware updates through internet

9DP

Pressurized Ion Chamber

Read more on page 10.



Area Monitor - 0.1 to 9999 μ R/hr

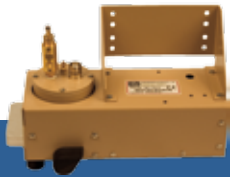
This area monitor combines Ludlum's venerable Model 375 area monitor controller with an 18 mm CsI scintillator detector that offers excellent low range sensitivity. The detector has a sensitivity of 120 cpm/ μ R/hr and is housed inside the Model 375 enclosure thereby simplifying installation.

Read more on page 32.

375/1

Area Monitor

New Products



44-110-2
Sample Counting Head

Windowless Sample Counting Head

This new sample head features a windowless gas flow proportional detector to optimize efficiencies for low-level energies. This sample head can connect to either Ludlum's Model 2000 counting system.

Read the specifications on page 29.

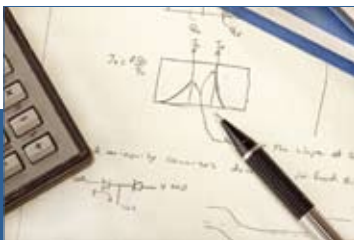


44-183
Shielded GM Detector

Shielded GM Detector

The Model 44-183 facilitates gamma surveys in high-background environments and in areas where elevated fields are directional. The detector design incorporates lead shielding that results in a 10:1 reduction in sensitivity from gammas entering in any direction but the bottom face.

Read the specifications on page 22.

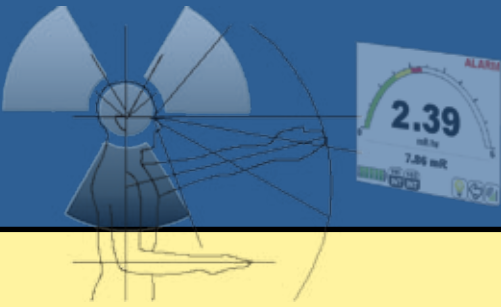


Customer Specials

We Do Custom Designs

Ludlum's vertically integrated manufacturing capability and customer oriented philosophy enables it to produce custom configurations and even new designs at affordable prices. If you have a unique application or cannot find exactly what you need, give us a call. You might be surprised to discover that we have already done it or something like it, or could easily modify something we already have. So don't summarily dismiss any great idea. Give us a chance to see if it's possible to meet your technical, budgetary, and schedule criteria.

Ordering Info



2011 Ludlum User Group Meeting August 8-9, 2011

Come join with us as we discuss new ideas, learn new technologies, listen to industry experts, and demonstrate the latest equipment from Ludlum Measurements. We will be meeting at the recently renovated Park Vista Hotel in Gatlinburg, Tennessee. The charge is only \$75 and includes all our training courses held on the first day. This venue is not only a great way to learn, but also an excellent way to meet your peers in the industry and even take the family along for a side vacation. Please visit our website for additional details.



Placing an Order

Phone: 800-622-0828 325-235-5494

Fax: 325-235-4672

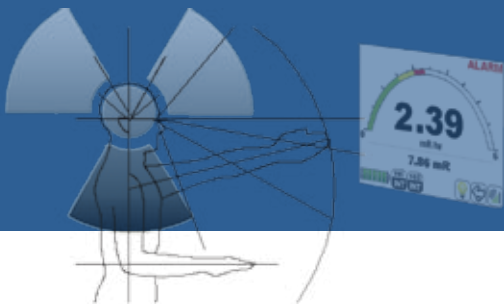
Email: ludlum@ludlums.com

Address: 501 Oak Street, P.O. Box 810, Sweetwater, Texas, USA 79556

Warranty

Ludlum Measurements, Inc. warrants the products covered in this website to be free of defects due to workmanship, material, and design for a period of twelve months from the date of delivery. The calibration of a product is warranted to be within its specified accuracy limits at the time of shipment. In the event of instrument failure, notify Ludlum Measurements, Inc. to determine if repair, recalibration, or replacement is required. This warranty excludes replacement of photomultiplier tubes, GM and proportional tubes, and scintillation crystals, which are broken due to excessive physical abuse or used for purposes other than intended. There are no warranties, express or implied, including without limitation and implied warranty or merchantability or fitness, which extend beyond the description of the face thereof. If the product does not perform as warranted herein, purchaser's sole remedy shall be repair or replacement, at the option of Ludlum Measurements, Inc. In no event will Ludlum Measurements be liable for damages, lost revenue, lost wages, or any other incidental or consequential damages arising from the purchase, use, or inability to use product.





GM Meters

Model 2401-EC



Budget

- 0-200 mR/hr (0-210 kcpm)
- 3-Decade Analog Meter
- Energy Compensated Internal GM Detector

Model 2401-EC2



Budget

- 0-2000 mR/hr
- 3-Decade Analog Meter
- Energy Compensated Internal GM Detector

Model 2401-ECX



Budget

- 0-20,000 mR/hr
- 5-Decade Analog Meter
- Dual Energy Compensated GM Detectors

Model 6

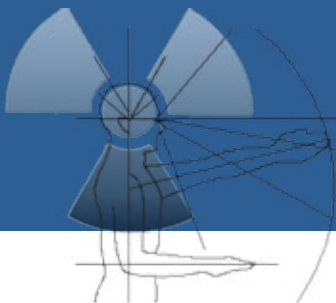


Traditional

- 0-1000 mR/hr
- 3-Decade Analog Meter
- Internal Energy Compensated GM Detector

Model	Sensitivity ¹³⁷ Cs	Alarm	Battery Life	Part Number
2401-EC	1050 cpm/mR/hr	No	250 hours	48-2824
2401-EC2	120 cpm/mR/hr	No	250 hours	48-2885
2401-ECX	1000 & 4.5 cpm/mR/hr	Yes	250 hours	48-3124
6	100 cpm/mR/hr	No	600 hours	48-1676

Model	Detector	Sensitivity	Efficiency (4π)	Alarm	Battery Life	Part Number
2401-EW	1.4 cm dia end window GM	1050 cpm/mR/hr		No	250 hours	48-2874
2401-P	15 cm ² (2.3 in ²) GM pancake	3300 cpm/mR/hr	5%- ¹⁴ C; 22%- ⁹⁰ Sr/ ⁹⁰ Y; 19%- ⁹⁹ Tc; < 1%- ^{99m} Tc; 32%- ³² P; 15%- ²³⁹ Pu	No	250 hours	48-2875
3 w/44-9	15 cm ² (2.3 in ²) GM pancake	3300 cpm/mR/hr	5%- ¹⁴ C; 22%- ⁹⁰ Sr/ ⁹⁰ Y; 19%- ⁹⁹ Tc; < 1%- ^{99m} Tc; 32%- ³² P; 15%- ²³⁹ Pu	No (optional)	2000 hours	48-1605 & 47-1539



GM Meters

Exposure Rate

Model 5



Traditional

- 0-2000 mR/hr
- 5-Decade Analog Meter
- Dual Energy Compensated GM Detectors

Model 2242



Traditional

- 0.1 mR/hr-999.9 R/hr
- 7-Decade Digital Meter
- Dual Energy Compensated GM Detectors
- RS-232 Port

Model 3 w/ 44-38



Traditional

- 0-200 mR/hr
- 4-Decade Analog Meter
- External Energy Compensated GM Detector

Model 14C w/ 44-38



Traditional

- 0-2000 mR/hr
- 5-Decade Analog Meter
- Dual Energy Compensated GM Detectors

Model	Sensitivity	Alarm	Battery Life	Part Number
5	1000 & 100 cpm/mR/hr	No	2000 hours	48-1607
2242	1000 & 0.7 cpm/mR/hr	Yes	200 hours	48-3437
3 w/44-38	1200 cpm/mR/hr	No (see Model 3A)	2000 hours	48-1605 & 47-1588
14C w/44-38	1200 & 200 cpm/mR/hr	No	2000 hours	48-1611 & 47-1588

Contamination & Exposure Rate

Model 2401-EW



Budget

- 0-210 kcpm/0-200 mR/hr
- 3-Decade Analog Meter
- End-Window GM Detector

Model 2401-P



Budget

- 0-50 kcpm/0-150 mR/hr
- 3-Decade Analog Meter
- 15 cm² GM Pancake Detector

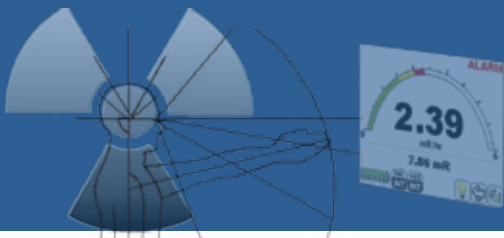
Model 3 w/ 44-9



Traditional

- 0-660 kcpm/0-200 mR/hr
- 4-Decade Analog Meter
- 15 cm² GM Pancake Detector

Ion Chambers



Model 9-3



Atmospheric

- 0-50 R/hr, 5 Ranges
- Temperature Compensated
- 1000 mg/cm² Beta Shield
- High Background Zero Capability
- Proportional Audio Output

Model 9-4



Atmospheric

- 0-50 R/hr, 5 Ranges
- Temperature & Pressure Compensated
- 1000 mg/cm² Beta Shield
- High Background Zero Capability
- PC-Controlled Calibration

Model 9DP



Pressurized

- 0-5 R/hr, 125 PSI Detector
- Rate, Integrate & Peak Readings
- Auto Zeroing & Ranging
- Data Logging
- Operator Friendly Digital Meter with Color LCD
- Rechargeable Batteries
- USB Connectivity




Model	Chamber Volume	Energy Response	Range Multipliers	Battery Life	Part Number
9-3	220 cm ³ (13.4 in ³)	± 20% of true value from 40 keV to 2 MeV	x1, x10, x100, x1k, x10k	100-500 hours (scale dependant)	48-3633
9-4	220 cm ³ (13.4 in ³)	± 20% of true value from 40 keV to 2 MeV	x1, x10, x100, x1k, x10k	100-400 hours (scale dependant)	48-3739
9DP	230 cm ³	beta > 1 MeV, gamma & X-ray > 25 keV	auto-ranging	12-24 hours between charges	48-3742

Model 9-7



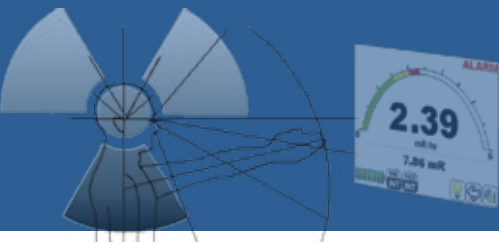
Hi-Range

- Digital Readout Instrument
- Connect to any Ludlum 9-7 or Eberline RO-7 probes
- Separate Battery Compartment
- Improved Replacement for Eberline Model RO-7

9-7 Detector Model	Range	Volume	Resolution	Part Number
9-7-LD 	0.01–19.9 mSv/h (0.001–1.99 R/hr)	50 cm ³ (3.1 in ³)	0.01 mSv/h (0.001 R/h or 1.0 mR/hr)	47-3693
9-7-BM 	0.001–1.99 Sv/h (0.1–199.9 R/h)	7 cm ³ (0.43 in ³)	1 mSv/h (0.1 R/h or 100 mR/hr)	47-3694
9-7-BH 	0.1–199.9 Sv/h (0.01–19.99 kR/hr)	7 cm ³ (0.43 in ³)	100 mSv/h (0.01 kR/hr or 10 R/hr)	47-3695

Options:

Extension Cables: 15 ft: 8293-689-15, 30 ft: 8293-689-30, 60 ft: 8293-689-60
 Rigid Detector: 2 ft: 4293-483, 5 ft: 4293-484
 Underwater Housing with 60 ft cable: 47-3760



microR Meters

Model 2401-S



Budget

- Internal Detector
- Sensitivity: 120 cpm/ μ R/hr
- 3-Decade Analog Meter

Model 19



Traditional

- Internal Detector
- Sensitivity: 175 cpm/ μ R/hr
- 5-Selectable Ranges
- Analog Meter with Backlight
- Fast & Slow Response Switch

Model 19A



Traditional

- Internal Detector
- Sensitivity: 175 cpm/ μ R/hr
- Logarithmic Analog Meter
- Audio & Visual Alarming

Model 192



Traditional

- Internal Detector
- Sensitivity: 650 cpm/ μ R/hr
- 4-Decade Analog Meter
- Fast & Slow Response Switch
- Meter Reset

Model 193-6



Traditional

- External Detector on Pole
- Sensitivity: 1500 cpm/ μ R/hr
- 4-Decade Analog Meter
- Special Deviation Alarm

Model 3 w/44-2



Traditional

- External, Detachable Detector
- Sensitivity: 175 cpm/ μ R/hr
- 4-Decade Analog Meter

Model 193 w/44-2



Traditional

- External, Detachable Detector
- Sensitivity: 175 cpm/ μ R/hr
- 4-Decade Analog Meter
- Special Deviation Alarm

Model 193 w/44-10

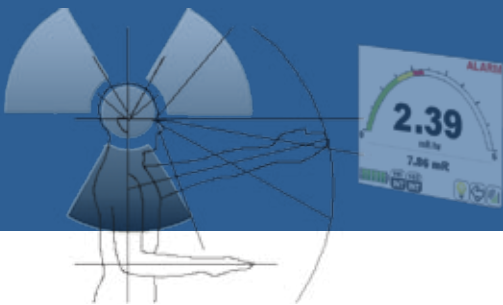


Traditional

- External, Detachable Detector
- Sensitivity: 900 cpm/ μ R/hr
- 4-Decade Analog Meter
- Special Deviation Alarm

Common Features: • Audio Output • Battery Test

Model	Detector	Range	Battery Life	Alarms	Part Number
2401-S	18 mm dia (0.7 in.) CsI scintillator	0-5000 μ R/hr	250 hours	Deviation	48-3117
19	2.5 x 2.5 cm (1 x 1 in.) NaI(Tl) Scintillator	0-5000 μ R/hr	2000 hours	None (see Model 19A)	48-1615
19A	2.5 x 2.5 cm (1 x 1 in.) NaI(Tl) Scintillator	0-5000 μ R/hr	600 hours	Fixed	48-2117
192	5.1 x 2.5 cm (2 x 1 in.) NaI(Tl) Scintillator	0-5000 μ R/hr	600 hours	Fixed & Deviation	48-2945
193-6	15.2 x 2.5 cm (6 x 1 in.) Plastic Scintillator	0-1000 μ R/hr	600 hours	Fixed & Deviation	48-3063
3 w/44-2	2.5 x 2.5 cm (1 x 1 in.) NaI(Tl) Scintillator	0-5000 μ R/hr	2000 hours	None (see Model 3A)	48-1606 & 47-1532
193 w/44-2	2.5 x 2.5 cm (1 x 1 in.) NaI(Tl) Scintillator	0-5000 μ R/hr	2000 hours	Fixed & Deviation	48-2959 & 47-1532
193 w/44-10	5.1 x 5.1 cm (2 x 2 in.) NaI(Tl) Scintillator	0-5000 μ R/hr	2000 hours	Fixed & Deviation	48-2959 & 47-1540



Neutron Meters

Model 12-4



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

Model 2241-4



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

Model 2363 w/42-41L



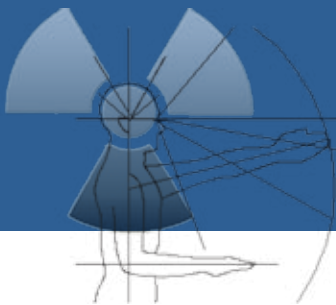
- Analog/Digital Ratemeter/Scaler
- Includes Internal Energy Compensated GM Detector
- Adjustable Alarms
- Weight: 1.6 kg (3.5 lb)

Model 15



- Analog Ratemeter
- Removable Moderator
- Includes Alpha/Beta & Gamma Detection Capability
- Weight: 3.7 kg (8.1 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 an 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 an appropriate inverse RPG curve for neutrons from thermal through 7 MeV, provides response up to 12 MeV	48-2973
2363 w 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
15	0-500,000 cpm	<u>Neutron:</u> 55 cpm/mRem/hr- bare ²⁴¹ AmBe <u>Gamma:</u> 2100 cpm/mR/hr αβ Efficiency: 2%- ¹⁴ C 10%- ⁹⁰ Sr/ ⁹⁰ Y 7%- ⁹⁹ Tc 7%- ²³⁹ Pu	< 10 cpm through 0.1 Sv/h (10 R/hr)	not linear through energy spectrum (0.025-12.0 MeV)	48-1614



Intrinsically Safe Meters

Model 3-IS-1



GM Exposure Meter

- 4-Decade Analog Meter
- 0-1000 mR/hr
- Internal Energy Compensated GM Detector

Model 3-IS



Versatile Survey Meter

- 4-Decade Analog Meter
- Supports external GM & Scintillator Detectors (see qualifying list in table below)

Model 25-IS



Radiation Monitor

- Digital Meter
- 0-1000 R/hr Dose Rate
- 0-1999 R Dose
- Internal Energy Compensated GM Detector
- Adjustable Alarms

Model 25-IS-1



Radiation Monitor

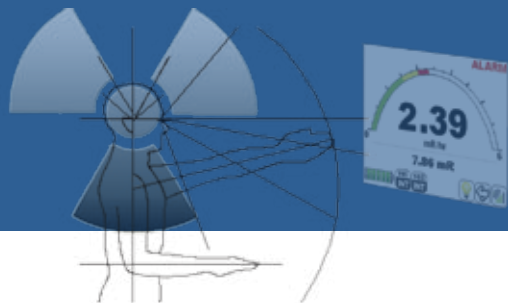
- Digital Meter
- 0.001 mSv/h-10 Sv/h Dose Rate
- 0-1999 Sv Dose
- Internal Energy Compensated GM Detector
- Adjustable Alarms

Model	Sensitivity (¹³⁷ Cs)	Alarm	Battery Life	Part Number																		
3-IS-1	100 cpm/mR/hr	No	2000 hours	48-3651																		
3-IS	<table border="1"> <thead> <tr> <th>Model No.</th> <th>Sensitivity</th> <th>Part No.</th> </tr> </thead> <tbody> <tr> <td>Model 44-9:</td> <td>3300 cpm/mR/hr</td> <td>47-1539</td> </tr> <tr> <td>Model 44-2:</td> <td>175 cpm/μR/hr</td> <td>47-1532</td> </tr> <tr> <td>Model 44-6:</td> <td>1200 cpm/mR/hr</td> <td>47-1535</td> </tr> <tr> <td>Model 44-38:</td> <td>1200 cpm/mR/hr</td> <td>47-1588</td> </tr> <tr> <td>Model 42-41L:</td> <td>350 cpm/mrem/hr</td> <td>47-3309</td> </tr> </tbody> </table>	Model No.	Sensitivity	Part No.	Model 44-9:	3300 cpm/mR/hr	47-1539	Model 44-2:	175 cpm/μR/hr	47-1532	Model 44-6:	1200 cpm/mR/hr	47-1535	Model 44-38:	1200 cpm/mR/hr	47-1588	Model 42-41L:	350 cpm/mrem/hr	47-3309	No	2000 hours	48-3581 plus detector (see qualified list of detectors in second column)
Model No.	Sensitivity	Part No.																				
Model 44-9:	3300 cpm/mR/hr	47-1539																				
Model 44-2:	175 cpm/μR/hr	47-1532																				
Model 44-6:	1200 cpm/mR/hr	47-1535																				
Model 44-38:	1200 cpm/mR/hr	47-1588																				
Model 42-41L:	350 cpm/mrem/hr	47-3309																				
25-IS	18 cpm/mR/hr	Yes	6000 hours	48-3661																		
25-IS-1	18 cpm/mR/hr	Yes	6000 hours	48-3686																		

CERTIFICATION

All the instruments on this page were designed and tested to the following USA standards for intrinsic safety, permitting them to be used in potentially explosive atmospheres.

- UL 913 Class I, II & III Division 1 Groups A, B, C, D
- CSA 22.22 No. 157
- UL 61010-1 CSA C22.2 No. 61010-1



Specialty Meters

Model 78



Stainless Telescoping Pole

- 1.2-3.7 m (4-12 ft)
- 0.1 mR/hr-1000 R/hr
- Analog/Digital Display
- Energy Compensated GM Detectors

Model 78-1



Stainless Telescoping Pole

- 1.2-3.7 m (4-12 ft)
- 1 μ Sv/h-10,000 mSv/h
- Analog/Digital Display
- Energy Compensated GM Detectors

Model 3-97



Combo NaI/GM

- Analog 4-Decade Ratemeter
- Dual Detectors
 - 2.5 x 2.5 cm NaI (0-3 mR/hr)
 - Energy Compensated GM (extends range up to 200 mR/hr)

Model 3-98

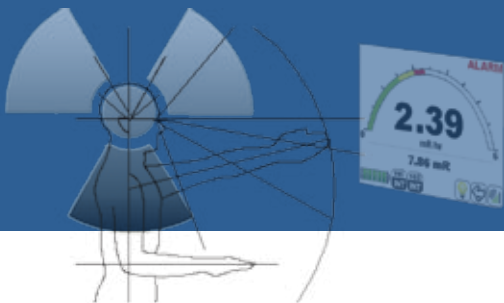


Combo NaI/GM

- Analog 4-Decade Ratemeter
- Dual Detectors for:
 - 125 I Detection
 - Alpha-Beta-Gamma Detection

Model	Application	Sensitivity	Alarms	Battery Life	Part Number
78	long reach, high range detector	Low range: 1050 cpm/mR/hr High range: 0.7 cpm/mR/hr	Yes	250 hours	48-2832
78-1	long reach, high range detection	Low range: 105 cpm/Sv/h High range: 70 cpm/mSv/h	Yes	250 hours	48-3743
3-97	wide range gamma meter	Internal NaI 2.5 x 2.5 cm (1 x 1 in.): 175 cpm/ μ R/hr External GM: 1200 cpm/mR/hr	No	600 hours	48-1410
3-98	125 I & Alpha-Beta Counting	External Model 44-3: 675 cpm/ μ R/hr 33.5% 125 I 18% 129 I Internal GM Pancake: 3300 cpm/mR/hr	No	600 hours	48-1135

Isotopic Identifiers



Model 702



2 x 2 in. NaI

- Quick Identification
- Color LCD
- Self Calibrating
- Flash Card Spectra Storage

Model 703



3 x 3 in. NaI

- Quick Identification
- Color LCD
- Self Calibrating
- Flash Card Spectra Storage

Model 711



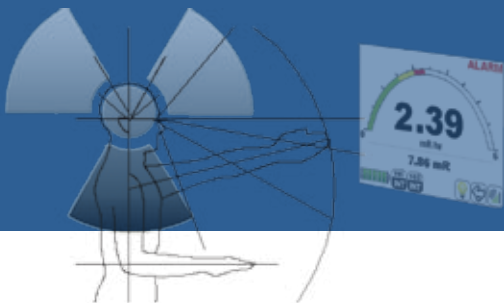
1.5 x 1.5 in. LaBr

- Quick Identification
- Color LCD
- Self Calibrating
- Flash Card Spectra Storage

Neutron Option

The 700-Series is available with an optional ³He neutron detector. It has a sensitivity of 13 cps/nv with the signal fed into a separate channel where it is displayed as cps. There is no identification involved.

Model	Detector(s)	Gamma Sensitivity	Neutron Sensitivity	Weight	Part Number
702	5 x 5 cm (2 x 2 in.) NaI	1500 cps/mSv/h (900 cpm/μR/hr)		2.38 kg (5.25 lb)	48-3643
702-1	5 x 5 cm (2 x 2 in.) NaI 2.5 dia x 15.7 cm long (1 x 6.2 in.) ³ He	1500 cps/mSv/h (900 cpm/μR/hr)	13 cps/nv	3.28 kg (7.25 lb)	48-3666
703	7.6 x 7.6 cm (3 x 3 in.) NaI	3833 cps/mSv/h (2300 cpm/μR/hr)		3.45 kg (7.6 lb)	48-3646
703-1	7.6 x 7.6 cm (3 x 3 in.) NaI 2.5 dia x 15.7 cm long (1 x 6.2 in.) ³ He	3833 cps/mSv/h (2300 cpm/μR/hr)	13 cps/nv	4.35 kg (9.6 lb)	48-3653
711	3.8 x 3.8 cm LaBr (1.5 x 1.5 in.)	800 cps/mSv/h (480 cpm/μR/hr)		2.04 kg (4.5 lb)	48-3644
711-1	3.8 x 3.8 cm LaBr (1.5 x 1.5 in.) 2.5 dia x 15.7 cm long (1 x 6.2 in.) ³ He	800 cps/mSv/h (480 cpm/μR/hr)	13 cps/nv	2.95 kg (6.5 lb)	48-3794



Survey Meters

General Purpose Rate Meters

Model 2403



Budget

- 3-Decade Analog Meter
- Pocket-Size
- Supports GM Detectors

Model 3



Traditional

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

Model 12



Traditional

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

Model 14C



Traditional

- 5-Decade Analog Meter
- Incorporates a built-in GM detector plus an external GM detector

Introduction

Ludlum's survey meters are world-reknown for their robustness, dependability, accuracy, and affordability. We have many models to choose from amongst our different lines to better satisfy your technical and budgetary requirements. Be sure to visit our website 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
2403 PN: 48-3136	550-900 Vdc	-35 mV	1	on/off/audiot, range selector	No	250 hours	4.6 x 8.4 x 13.5 cm 1.8 x 3.3 x 5.3 in.	0.4 kg 0.9 lb
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
16 PN: 48-1612	400-2500 Vdc	-2 to -60 mV	1	off, battery check, range selector, audio, fast/slow, reset, HV check, window in-out	No	600 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
18 PN: 48-1613	3 separate settings 400-2500 Vdc	-2 to -60 mV	3	off, battery check, range selector, audio, fast/slow, reset, HV check, window in-out, detector select	No	600 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
3-IS PN: 48-3581	400-1000 Vdc	-40 mV	1	off, battery check, range selector, audio, fast/slow, reset	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

Survey Meters

General Purpose Rate Meters



Model 16



Traditional

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

Model 18



Traditional

- 4-Decade Analog Meter
- Supports GM, Proportional & Scintillator Detectors
- Supports 3-Detector Setups
- Adjustable Window

Model 3-IS



Intrinsically Safe

- Meets USA Intrinsic Safety Standards
- 4-Decade Analog Meter
- Supports Certified GM & Scintillator Detectors

Survey Meters

General Purpose Scaler Rate Meters

Model 2221



- Analog Rate Meter with Digital LCD for either Ratemeter or Scaler Readout
- 4-Decade, Manual Ranging plus Logarithmic
- Supports GM, Proportional & Scintillator Detectors
- RS-232 Port

Model 2224-1



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

Model 2241-3



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

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 afford convenient swapping of probes 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
2221 PN: 48-2065	1	400-2400 Vdc	yes, switch selectable between gross and energy window	0.1, 0.5, 1, 2, 5, 10 minutes or continuous	none	250 hours	22.9 x 10.9 x 25.4 cm (9 x 4.3 x 10 in.)	2.5 kg 5.5 lb
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
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

General Purpose Data Loggers

Model 2350-1



Traditional

- Digital Readout Meter
- 5-Decade, Auto Ranging
- Stores 1000 Data Points
- Supports GM, Proportional & Scintillator Detectors
- Ratemeter/Scaler Modes
- Supports 16 Detector Setups
- DTC & Adjustable Window
- RS-232 Port

Model 2360



Traditional

- Analog Readout Meter with Digital Scaler LCD
- 4-Decade, Manual Ranging
- Stores 550 Data Points
- Supports Proportional & Scintillator Detectors
- Ratemeter/Scaler Modes
- RS-232 Port

Introduction

The general purpose Model 2350-1 is Ludlum's most advanced ratemeter/scaler/data logger and is designed to satisfy a wide range of applications. The large backlit LCD presents bar graphs, digital readings, and logged data on an 8-line by 15-character display. Up to 1000 data points can be stored, along with the location, date/time stamp, detector, count mode, count time, logging mode, and sample number. Location code information can be input via an optional bar code reader.

The Model 2360 is optimized for alpha & beta contamination surveying. A front panel switch facilitates counting alpha only, beta only or alpha plus beta and logging the results. The display utilizes a traditional analog meter supplemented by a digital LCD for the scaler readout.

Specifications

Ludlum Model	High Voltage	Threshold	Scaler Times	Controls	Alarm	Battery Life	Size (H x W x L)	Weight
2350-1 PN: 48-2751	400-2500 Vdc	-100 to -1000 mV	1-65,535 seconds	on/off/backlight, audio volume, divide-by,ack/scroll	Ratemeter: Yes Scaler: Yes	> 75 hours	15.2 x 10.9 x 22.4 cm 6.0 x 4.3 x 8.8 in.	2.3 kg 5.0 lb
2360 PN: 48-2872	200-2000 Vdc	beta: -2 to -15 mV alpha: -40 to -700 mV	0.1, 0.5, 1, 2, 5, 10, 60, minutes & user-defined	off/battery check/range-selector, alpha/beta mode/scaler count time, reset/read HV, audio volume	Ratemeter: Yes Scaler: Yes	300 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

Benchtop Ratemeters

Model 177



Standard HV Range

- Detectors Supported:
 - GM
 - Scintillation

Model 177-50



Wide Range HV

- Detectors Supported:
 - GM
 - Scintillation
 - Proportional
- Logarithmic Readout

Model 177-61



Wide Range HV

- Detectors Supported:
 - GM
 - Scintillation
 - Proportional

Model 177-84



Simultaneous Alpha/Beta

- Dual Meters, Alarms, and Audio Signatures
- Scaler
- Detectors Supported:
 - Scintillation
 - Proportional

Model	High Voltage	Threshold	Meter Dial	Multipliers	Response	Part Number
177	400-1500 Vdc	-10 to -100 mV	0-500 cpm, 0-1.5 kV; BAT TEST	x1, x10, x100, x1K	FAST: 2.2 seconds SLOW: 22 seconds	48-1632
177-50	400-2500 Vdc	-2 to -100 mV	10-1,000,000 cpm logarithmic 0-2.5 kV; BAT TEST	None	Count rate dependent, typically not greater than 8 seconds	48-1202
177-61	400-2500 Vdc	-2 to -100 mV	0-500 cpm; 0-2.5 kV; BAT TEST	x1, x10, x100, x1K	FAST: 2.2 seconds SLOW: 22 seconds	48-1382
177-84	200-2500 Vdc	alpha: 1-180 mV beta: 1-4 mV	alpha: 0-1000 cpm beta: 100-100,000 cpm	None	alpha: varies 5-15 seconds beta: varies 1-5 seconds	48-2727

Common Specifications

AUDIO: built-in unimorph speaker, with volume control, to provide click-per-event audio or audible alarm indicator

ALARM SET: front-panel locking control allowing alarm to be set at any point on the meter (can be read on meter)

ALARM: indicated by red lamp and full volume audible tone (greater than 60 dB at 61 cm [2 ft])

CALIBRATION CONTROLS: accessible from back of instrument (protective cover provided)

RESET: pushbutton to zero meter and/or reset alarm

DATA OUT: 9-pin series "D" connector allowing for external connections of the following items: battery, unregulated supply, instrument common ground, alarm signal (current sink), pulse out, external background subtract, and recorder output

RECORDER OUTPUT: correlated to meter reading (adjustable to 1 volt at 1 mA)

POWER: 95-135 Vac (178-240 Vac available), 50-60 hz, 6-volt sealed lead-acid rechargeable battery (built-in)

BATTERY LIFE: typically 50 hours in non-alarm condition (battery condition can be checked on meter)

BATTERY CHARGER: battery is continuously trickle-charged when instrument is connected to line power and turned on (optional external fast charger available)









SIZE: 12.7 x 20.3 x 15.2 cm (5 x 8 x 6 in.) (H x W x L)

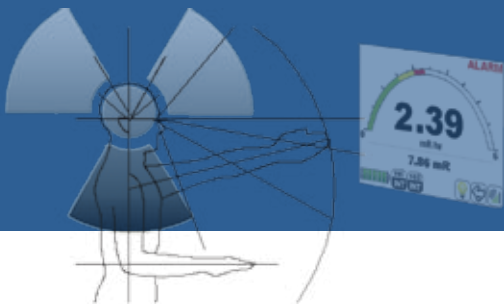
WEIGHT: 1.9 kg (4.2 lb)



Detectors

Alpha

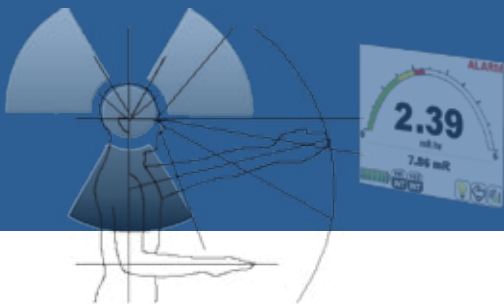
Model	Application	Detector Type	Area (active/open)	Window	Efficiency (4π)	Background	Operating Voltage (Vdc)	Part Number
 43-1	contamination survey	scintillation, ZnS(Ag)	83 cm ² / 75 cm ²	0.8 mg/cm ²	35% ⁻²³⁹ Pu	3 cpm or less	500-1200	47-1516
 43-2	contamination survey	scintillation, ZnS(Ag)	12 cm ² / 12 cm ²	0.8 mg/cm ²	30% ⁻²³⁹ Pu, 30% ⁻²³⁰ Th	3 cpm or less	500-1200	47-1517
 43-40-2	contamination survey	air proportional	239 cm ² / 188 cm ²	0.4 mg/cm ²	10% ⁻²³⁹ Pu	3 cpm or less	altitude dependent 1875-2050	47-3434
 43-40-3	contamination survey	air proportional	320 cm ² / 253 cm ²	0.4 mg/cm ²	10% ⁻²³⁹ Pu	3 cpm or less	altitude dependent 1875-2050	47-3435
 43-92	contamination survey	scintillation, ZnS(Ag)	100 cm ² / 88 cm ²	0.8 mg/cm ²	20% ⁻²³⁹ Pu	3 cpm or less	500-1200	47-2555
 43-44-1	contamination survey	air proportional	154 cm ² / 100 cm ²	0.4 mg/cm ²	8% ⁻²³⁹ Pu	3 cpm or less	altitude dependent 1875-2050	47-2385
 43-5	contamination survey	scintillation, ZnS(Ag)	76 cm ² / 50 cm ²	0.8 mg/cm ²	13% ⁻²³⁹ Pu	3 cpm or less	500-1200	47-1521
 43-65	contamination survey	scintillation, ZnS(Ag)	63 cm ² / 50 cm ²	0.8 mg/cm ²	17% ⁻²³⁹ Pu, 17% ⁻²³⁰ Th	3 cpm or less	500-1200	47-1441



Detectors




Gamma

Model	Application	Detector Type	Area (Active/Open)	Window	Efficiency (4 π)	Linear Range w DTC	Bkg (cpm)	Sensitivity	Dead Time	Energy Response	Operating Voltage Vdc	Part Number
44-3 	¹²⁹ I, low energy gamma survey 10-60 keV	1 in. dia x 1 mm thick NaI(Tl)	5 cm ² / 5 cm ²	18.4 mg/cm ²	33.5% ⁻¹²⁵ I, 18% ⁻¹²⁹ I		< 350	675 cpm/μR/hr (¹²⁵ I)		energy dependent	500-1200	47-1533
44-17 	¹²⁵ I, low energy gamma survey 10-200 keV	2 in. dia x 2 mm thick NaI(Tl)	17.8 cm ² / 17.8 cm ²	43 mg/cm ²	33.5% ⁻¹²⁵ I, 22% ⁻¹²⁹ I		< 1500	2500 cpm/μR/hr (¹²⁵ I)		energy dependent	500-1200	47-1547
44-2 	gamma survey, 50 keV-1.5 MeV	1 in. dia x 1 in. thick NaI(Tl)					1900	175 cpm/μR/hr (¹³⁷ Cs)		energy dependent	500-1200	47-1532
44-10 	gamma survey, 50 keV-3.0 MeV	2 in. dia x 2 in. thick NaI(Tl)					9750	900 cpm/μR/hr (¹³⁷ Cs)		energy dependent	500-1200	47-1540
44-62 	gamma survey, 50 keV-1.5 MeV	0.5 in. dia x 1 in. thick NaI(Tl)					600	49 cpm/μR/hr (¹³⁷ Cs)		energy dependent	500-1200	47-1238
44-11 	gamma survey	2 in. dia x 2 in. thick NaI(Tl), integral line					9750	900 cpm/μR/hr (¹³⁷ Cs)		energy dependent	500-1200	47-1541
44-20 	gamma survey	3 in. dia x 3 in. thick NaI(Tl), integral line					23,000	2300 cpm/μR/hr (¹³⁷ Cs)		energy dependent	500-1200	47-1104
44-183 	shielded directional gamma survey	GM, energy compensated				1 mR/hr-10 R/hr	10:1 ratio front to back	100 cpm/mR/hr	≈ 50 μsec	± 15%	550	47-3758
133-2 	gamma survey, dose rate	GM, energy compensated				0.1 mR/hr-1 R/hr	≈ 12 cpm @ 10 μR/hr	1000 cpm/mR/hr	≈ 50 μsec	± 25%	550	47-1717
133-4 	gamma survey, dose rate	GM, energy compensated				1 mR/hr-10 R/hr	≈ 1 cpm @ 10 μR/hr	100 cpm/mR/hr	≈ 50 μsec	± 15%	550	47-1674





Detectors



Gamma (continued)

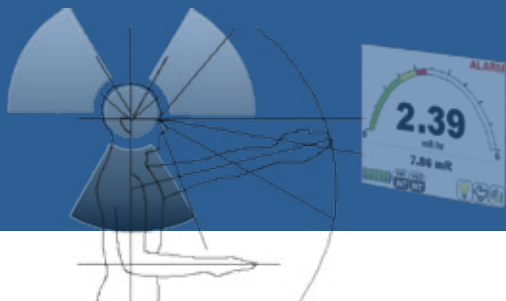
Model	Application	Detector Type	Area (Active/Open)	Window	Efficiency (4 π)	Linear Range w DTC	Bkg (cpm)	Sensitivity	Dead Time	Energy Re-sponse	Operating Voltage Vdc	Part Number
133-6 	gamma survey, dose rate	GM, energy compensated				4 mR/hr-40 R/hr	< 1 cpm	18 cpm/mR/hr	≈ 50 μsec	± 15%	550	47-1718
133-7 	gamma survey, dose rate	GM, energy compensated				25 mR/hr-100 R/hr	< 1 cpm	4.2 cpm/mR/hr	≈ 50 μsec	± 15%	460	47-1216
133-8 	gamma survey, dose rate	GM, energy compensated				150 mR/hr-1000 R/hr	< 1 cpm	0.7 cpm/mR/hr	≈ 50 μsec	± 25%	460	47-1226

Beta

Model	Application	Detector Type	Area (Active/Open)	Window	Efficiency (4 π)	Bkg	Operating Voltage Vdc	Part Number
44-1 	survey, sample counting	1.7 in. dia x 0.01 in. thick plastic scintillator	11.6 cm ² /11.6 cm ²	1.2 mg/cm ²	7%- ¹⁴ C	100 cpm in 10 μR/hr	500-1200	47-1531
44-142 	contamination survey	0.01 in. thick plastic scintillator	100 cm ² /88 cm ²	1.2 mg/cm ²	4%- ¹⁴ C, 30%- ⁹⁰ -Sr/ ⁹⁰ Y, 20%- ⁹⁹ Tc	≤ 300 cpm in 10 μR/hr	500-1200	47-3161





Neutron

Model	Application	Detector Type	Bkg	Sensitivity	Energy Re-sponse	Operating Voltage Vdc	Part Number
42-31H 	neutron survey	³ He proportional with 9 in. polyethylene moderator	gamma rejection ≤ 10 cpm through 10 R/hr	100 cpm/mrem/hr (²⁴¹ AmBe)	follows RPG curve for neutron dose	1200	4005-140
42-41L 	neutron survey	Prescila, proton recoil scintillator	gamma rejection ≤ 400 cpm through 100 mR/hr (¹³⁷ Cs)	350 cpm/mrem/hr (²⁴¹ AmBe)	thermal through 100 MeV	500-700	47-3309







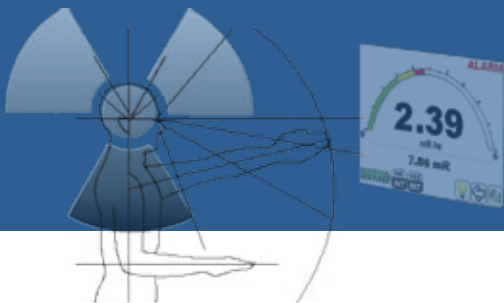
Detectors

Alpha/Beta

Model	Application	Detector Type	Area (Active/Open)	Window	Efficiency (4 π)	Bkg	Cross-Talk	Operating Voltage Vdc	Part Number
43-1-1 	contamination survey	ZnS(Ag) on 0.010 in. plastic scintillator	83 cm ² / 75 cm ²	1.2 mg/cm ² aluminized Mylar	30%- ²³⁹ Pu, 30%- ⁹⁰ Sr/ ⁹⁰ Y, 4%- ¹⁴ C	alpha: < 3 cpm, beta: ≤ 300 cpm	alpha-beta: < 10%, beta-alpha: < 1%	500-1200	47-2336
43-2-2 	contamination survey	ZnS(Ag) on 0.010 in. plastic scintillator	12 cm ² / 12 cm ²	1.2 mg/cm ² aluminized Mylar	25%- ²³⁹ Pu, 20%- ⁹⁰ Sr/ ⁹⁰ Y, 5%- ¹⁴ C	alpha: < 3 cpm, beta: ≤ 50 cpm	alpha-beta: < 10%, beta-alpha: < 1%	500-1200	47-2003
43-93 	contamination survey	ZnS(Ag) on 0.010 in. plastic scintillator	100 cm ² / 88 cm ²	1.2 mg/cm ² aluminized Mylar	20%- ²³⁹ Pu, 20%- ⁹⁰ Sr/ ⁹⁰ Y, 15%- ⁹⁹ Tc	alpha: < 3 cpm, beta: ≤ 300 cpm	alpha-beta: < 10%, beta-alpha: < 1%	500-1200	47-2556
43-68 	contamination survey	gas proportional, P-10	126 cm ² / /100 cm ²	0.8 mg/cm ² aluminized Mylar	Optimized for alpha or beta: 20%- ²³⁹ Pu, 15%- ¹⁴ C, 30%- ⁹⁹ Tc, 30%- ⁹⁰ Sr/ ⁹⁰ Y < 1% gamma, simultaneous alpha-beta: 17.5%- ²³⁹ Pu, 20%- ⁹⁹ Tc, 20%- ⁹⁰ Sr/ ⁹⁰ Y	alpha: < 7 cpm, beta-gamma: ≈ 350 cpm (10 μR/hr field)	alpha-beta: < 10%, beta-alpha: < 1%	alpha: 1100-1400 beta-gamma: 1600-1800	47-2005






Alpha-Beta-Gamma

Model	Application	Detector Type	Area (Active/Open)	Window	Efficiency (4 π)	Bkg	Sensitivity (¹³⁷ Cs)	Dead-Time	Energy Response	Operating Voltage Vdc	Part Number
44-7 	survey, sample counting	GM, end window	6 cm ² / 5 cm ²		2%- ¹⁴ C, 10%- ⁹⁰ Sr/ ⁹⁰ Y, 7%- ⁹⁹ Tc, 7%- ²³⁹ Pu	40 cpm	2100 cpm/mR/hr	250 μsec	energy dependent	900	47-1536
44-9 	survey, sample counting	GM, pancake	15 cm ² / 12 cm ²	1.7 ± 0.3 mg/cm ² mica	5%- ¹⁴ C, 22%- ⁹⁰ Sr/ ⁹⁰ Y, 19%- ⁹⁹ Tc, 32%- ³² P, 15%- ²³⁹ Pu	60 cpm	3300 cpm/mR/hr	80 μsec	energy dependent (See page 5)	900	47-1539
44-40 	survey, sample counting	GM, pancake	15 cm ² / 12 cm ²	1.7 ± 0.3 mg/cm ² mica	5%- ¹⁴ C, 22%- ⁹⁰ Sr/ ⁹⁰ Y, 19%- ⁹⁹ Tc, 32%- ³² P, 15%- ²³⁹ Pu	25 cpm	3300 cpm/mR/hr	80 μsec	energy dependent	900	47-1538
44-88 	survey, sample counting	GM, pancake with lead housing	15 cm ² / 12 cm ²	1.7 ± 0.3 mg/cm ² mica	5%- ¹⁴ C, 22%- ⁹⁰ Sr/ ⁹⁰ Y, 19%- ⁹⁹ Tc, 32%- ³² P, 15%- ²³⁹ Pu	60 cpm	3300 cpm/mR/hr	80 μsec	energy dependent	900	47-2356



Detectors

Beta-Gamma

Model	Applica-tion	Detector Type	Area (Active/Open)	Window	Efficiency (4 π)	Bkg	Sensi-tivity	Dead Time	Energy Response	Beta Cut-off	Operat-ing Voltage Vdc	Part Number
44-6 	exposure measurements	GM		30-45 mg/cm ² stainless steel wall, housing: 1000 mg/cm ²	<u>closed</u> 17% ⁻⁶⁰ Co 0.35% ⁻¹³⁷ Cs <u>open</u> 19% ⁻⁶⁰ Co 0.50% ⁻¹³⁷ Cs	<u>closed</u> 20 cpm, <u>open</u> 25 cpm	1200 cpm/mR/hr (¹³⁷ Cs)	95 μsec	energy dependent	≈ 200 keV (window open)	900	47-1535
44-38 	dose rate measurements	GM, energy compensated		30-45 mg/cm ² stainless steel wall, housing: aluminum	<u>closed</u> 18% ⁻⁶⁰ Co 0.37% ⁻¹³⁷ Cs <u>open</u> 21% ⁻⁶⁰ Co 0.48% ⁻¹³⁷ Cs	closed: 20 cpm, open: 25 cpm	1200 cpm/mR/hr (¹³⁷ Cs)	95 μsec	± 15% from 50 keV-1.25 MeV	≈ 200 keV (window open)	900	47-1588
44-92 	contamination survey	Sealed gas proportional, Xenon	169 cm ² /140 cm ²	6 mg/cm ² aluminized Mylar	10% ⁻¹⁴ C 13% ⁻⁹⁹ Tc 24% ⁻³⁶ Cl 26% ⁻⁹⁰ Sr/ ⁹⁰ Y 3% ⁻¹²⁹ I 1.6% ⁻⁵⁷ Co 1.2% ⁻⁵⁵ Fe 10% ⁻²³⁹ Pu	700 cpm	36,000 cpm/mR/hr (⁶⁰ Co)	30 μsec			1350-1600	47-2362
44-110 	tritium surface contamination	gas flow, P-10	126 cm ² /100 cm ²	windowless	25% ⁻³ H	400 cpm	N/A	N/A			1700	47-2585
44-21 	low energy beta-gamma	1 in. dia x 1 mm thick NaI adhered to a 0.001 in. thick plastic scintillator	5.1 cm ² /5.1 cm ²	3.4 mg/cm ²	19% ⁻¹²⁹ I 5% ⁻¹⁴ C 28% ⁻³² P	450 cpm	20 kcpm/mR/hr (¹³⁷ Cs)	10-15 μsec	energy dependent		500-1200	47-1560
44-98 	surveying, sample counting	1 in. dia x 1 mm thick BGO	5 cm ² /5 cm ²	1.2 mg/cm ²	10% ⁻¹⁴ C 20% ⁻¹²⁹ I	650 cpm		10-15 μsec			500-1200	47-2465
44-172 	beta & low energy gamma	1 in. dia x 1 mm thick YSO	5 cm ² /5 cm ²	1.2 mg/cm ²	25% ⁻¹²⁹ I 8% ⁻¹⁴ C 7% ⁻⁵⁵ Fe 2.5% ⁻¹³⁷ Cs 11.7% ⁻²⁴¹ Am 7.4% ⁻⁵⁷ Co	300 cpm		10-15 μsec	5-145 keV		500-1200	47-3543

Sample Counting Systems

Alpha/Beta

Model 3030E w/43-10-1



ZnS(Ag)/Scintillator

- 5.1 cm (2.1 in.) Sample Size
- Best Value
- Light Weight
- 8-Hour Battery Backup
- RS-232 Output

Model 3030



ZnS(Ag)/Scintillator

- 5.1 cm (2.1 in.) Sample Size
- Shielded for Lower Beta Background
- Convenient Integrated Design
- 8-Hour Battery Backup
- RS-232 Output

Model 3030P



Solid State

- 5.1 cm (2.1 in.) Sample Size
- Ultra-Low Backgrounds
- Ultra-Low Crossover
- Radon Reduction
- Internal Data Logging
- 48-Hour Battery Backup
- USB Port

Common Features

- Independent Alpha & Beta Readouts
- Background Subtraction
- Alarms
- CPM & DPM Modes
- QC Check
- Real Time Clock

Model	Detector	Window	4 π Efficiency	Back-ground	Weight	Part Number
3030E w/43-10-1	ZnS(Ag) adhered to plastic scintillator	0.4 mg/cm ²	37% ^{-239Pu} 32% ^{-230Th} 39% ^{-238U} 5% ^{-14C} 27% ^{-99Tc} 29% ^{-137Cs} 26% ^{-90Sr/90Y}	Alpha: \leq 3 cpm, Beta: \leq 80 cpm	4.5 kg (10 lb)	48-3456
3030	ZnS(Ag) adhered to plastic scintillator	0.4 mg/cm ²	32% ^{-230Th} 39% ^{-238U} 37% ^{-239Pu} 8% ^{-14C} 27% ^{-99Tc} 27% ^{-137Cs} 26% ^{-90Sr/90Y}	Alpha: \leq 3 cpm, Beta: \leq 50 cpm	13.2 kg (29 lb)	48-3204
3030P	PIPS™ <i>(Trademark of Canberra Industries)</i>	na	35% ^{-239Pu} 15% ^{-99Tc} 23% ^{-137Cs} 34% ^{-90Sr/90Y}	10 min count Alpha: 0 cpm, Beta: 30 cpm	3.4 kg (7.5 lb)	48-3509

Sample Counting Systems

Gamma

Model 2200 w/243



NaI(Tl)/Scintillator

- 1.3 cm (0.5 in.) Lead Shielding
- Single Channel Analysis
- 120-Hour Battery Backup
- RS-232 Output

Model 2000 w/203



NaI(Tl)/Scintillator

- 3.8 cm (1.5 in.) Lead Shielding
- Gross Counting
- 120-Hour Battery Backup
- RS-232 Output

Model 2100



NaI(Tl)/Scintillator

- 3.8 cm (1.5 in.) Lead Shielding
- Conveyor Sample Feed
- Hi/Low Energy Counting
- Color LCD
- Ethernet Connectivity
- USB Ports
- Remote Alarm Output

Model 2100-1



NaI(Tl)/Scintillator

- 3.8 cm (1.5 in.) Lead Shielding
- Manual Sample Feed
- Hi/Low Energy Counting
- Color LCD
- Ethernet Connectivity
- USB Ports
- Remote Alarm Output

Model	Detector	Well Size	Efficiency	Back-ground	Weight	Part Numbers
2200 w/243	5.1 x 4.6 cm (2 x 1.8 in.) (Dia x L) NaI(Tl) scintillator	1.7 x 3.9 cm (0.7 x 1.6 in.) (Dia x L)	65% ⁻¹²⁹ I 90% ^{-99m} Tc 33% ⁻¹³⁷ C 43% ⁻⁶⁰ Co	≤ 1000 cpm	16.6 kg (37 lb)	48-1651 & 47-1621
2000 w/203	5.1 x 4.6 cm (2 x 1.8 in.) (Dia x L) NaI(Tl) scintillator	1.7 x 3.9 cm (0.7 x 1.6 in.) (Dia x L)	65% ⁻¹²⁹ I 90% ^{-99m} Tc 33% ⁻¹³⁷ C 43% ⁻⁶⁰ Co	≤ 500 cpm	60 kg (132 lb)	48-1648 & 47-1638
2100	5.1 x 5.1 cm (2 x 2 in.) NaI(Tl) scintillator	1.3 x 5 x 7 cm (0.5 x 2 x 2.75 in.) (H x W x L)	0.1 Bq/g in < 1 minute (standard 100 gram sample) (⁶⁰ Co)	≈1200 cpm (sum channel)	24.9 kg (55 lb)	48-3780
2100-1	5.1 x 5.1 cm (2 x 2 in.) NaI(Tl) scintillator	7 x 1.3 cm (2.75 x 0.5 in.) (D x H)	0.1 Bq/g in < 1 minute (standard 100 gram sample) (⁶⁰ Co)	≈1200 cpm (sum channel)	22.7 kg (50 lb)	48-3781

Planchets

Stainless & Aluminum Planchets

Ludlum now manufactures its own sample planchets. They have a diameter of 5.1 cm (2.0 in.) and can be purchased in either aluminum or stainless steel. The minimum order quantity is 500.



Material	Part Number
Aluminum	7525-371
Stainless Steel	7525-371-01

Sample Counting Components

Scaler Counters

Model 2000



Single Channel

- 200-2500 Vdc
- Scaler Range: 0-999 minutes or seconds
- 120-Hour Battery Backup
- RS-232 Output

Model 2200



Single Channel Analyzer

- 200-2500 Vdc
- Adjustable Window
- Scaler Range: 0-999 minutes or seconds
- 120-Hour Battery Backup
- RS-232 Output









Model 3030E



Dual Channel w/SCA

- 200-2500 Vdc
- Dual SCA Channels
- QC Check
- Independent Channel Readouts
- Background Subtraction & Crosstalk Correction
- Alarms
- RS-232 Output

Sample Holders

Model	Applica-tion	Suggested Detectors	Sample Size	Tray Heights	Weight	Construction	Part Number
 180-1	repeatable counting of wipes, filter paper, or slides	43-2, 44-1, 44-2, 44-3, 44-21, 44-98, all 2 in. OD detectors	4.7 cm (1.8 in.) max	0.32 cm (0.125 in.) 0.64 cm (0.25 in.) 1.3 cm (0.5 in.) 2.5 cm (1.0 in.) 5.1 cm (2.0 in.)	0.5 kg (1.1 lb)	anodized aluminum frame and sample tray	47-1675
 180-2	repeatable counting of wipes, filter paper, or slides	44-9	4.7 cm (1.8 in.) max	same as Model 180-1	0.4 kg (0.9 lb)	anodized aluminum frame and sample tray	47-1665
 180-4	repeatable counting of wipes, filter paper, or slides	44-7	4.7 cm (1.8 in.) max	same as Model 180-1	0.35 kg (0.76 lb)	anodized aluminum frame and sample tray	47-1667
 180-7	repeatable counting of wipes, filter paper, or slides	44-10, 44-17, all 2.6 in. OD detectors	4.7 cm (1.8 in.) max	same as Model 180-1	0.5 kg (1.1 lb)	anodized aluminum frame and sample tray	47-1582
 180-1L	repeatable counting of wipes, filter paper, or slides	43-2, 44-1, 44-2, 44-3, 44-21, 44-98, all 2 in. OD detectors	4.7 cm (1.8 in.) max	same as Model 180-1	1.4 kg (3 lb)	painted lead collimator with aluminum frame and sample tray	47-2988
 180-9	low-background sample counting	44-10, 44-11, 44-17	4.7 cm (1.8 in.) max	same as Model 180-1	118 kg (260 lb)	3.8 cm (1.5 in.) lead housing with beige powder coat paint	47-1591
 180-15	repeatable counting of wipes, filter paper, or slides	44-40	5.1 x 1.5 cm (2.0 x 0.6 in. (Dia x height))	<u>Dia. x Depth (inches)</u> 1 x 0.125 2 x 0.125 2 x 0.656 2.5 x 0.50	1.1 kg (2.3 lb)	painted aluminum frame and anodized aluminum sample tray	47-1111
 180-16	repeatable counting of wipes, filter paper, or slides	43-1	10.2 cm (4 in.)	same as Model 180-1	1.2 kg (2.7 lb)	anodized aluminum frame and sample tray	47-1132

Sample Counting Components

Sample Counting Heads

Model	Type	Sample Size	Detector	Window	Voltage	Efficiency	Background	Part Number
43-9 	Alpha	2.5 cm (1.5 in.)	ZnS(Ag)	0.4 mg/cm ²	500-1200	30%- ²³⁰ Th	≤ 3 cpm	47-1525
43-10 	Alpha	5.1 cm (2 in.)	ZnS(Ag)	windowless	500-1200	37%- ²³⁹ Pu	≤ 3 cpm	47-1526
43-78 	Alpha	12.7 x 0.46 cm (5 x 0.18 in.)	ZnS(Ag) adhered to a 0.6 cm (0.25 in.) light pipe	windowless	500-1200	37%- ²³⁰ Th 37%- ²³⁹ Pu	≤ 3 cpm	47-2180
43-78-1 	Beta	12.7 x 0.46 cm (5 x 0.18 in.)	plastic scintillator to a 0.6 cm (0.25 in.) light pipe	windowless	500-1200	40%- ⁹⁰ Sr/ ⁹⁰ Y 12%- ¹⁴ C 35%- ⁹⁹ Tc	beta-gamma ≤ 500 cpm	47-2307
43-10-1 	Alpha/ Beta	2.5 cm (1.5 in.)	ZnS(Ag) adhered to plastic scintillator	0.4 mg/cm ²	500-1200	37%- ²³⁹ Pu 32%- ²³⁰ Th 39%- ²³⁸ U 5%- ¹⁴ C 27%- ⁹⁹ Tc 29%- ¹³⁷ Cs 26%- ⁹⁰ Sr/ ⁹⁰ Y	Alpha: ≤ 3 cpm Beta: ≤ 80 cpm	47-1305
43-78-2 	Alpha/ Beta	7.6 x 0.46 cm (3.0 x 0.18 in.)	ZnS(Ag) adhered to plastic scintillator	0.4 mg/cm ²	800-1500	37%- ²³⁹ Pu 37%- ⁹⁰ Sr/ ⁹⁰ Y	Alpha: ≤ 7 cpm per 10 min count; Beta: ≤ 100 cpm	47-2620
120 	Alpha/ Beta	5.1 cm (2 in.)	gas flow	0.4 mg/cm ²	alpha: 900-1300, beta: 1300-1700	10%- ¹⁴ C 42%- ⁹⁰ Sr/ ⁹⁰ Y 35%- ²³⁰ Th less than 1% - gamma	Alpha: ≤ 3 cpm Beta: ≤ 100 cpm	47-1625
44-110-2 	Low Energy	2.5 or 5.1 cm	gas flow	windowless	1700-1900	14%- ⁶³ Ni, 40%- ²³⁹ Pu	< 100 cpm	47-3678
180-8 	Alpha- Beta- Gamma	0.32 to 5.1 cm selectable spacing	end window GM with 1.5 in. lead shielding	1.7 mg/cm ²	900	2%- ¹⁴ C, 10%- ⁹⁰ Sr/ ⁹⁰ Y, 7%- ²³⁹ Pu	14 cpm	47-1549
182 	Radon Flask Counter	7.6 x 17.1 cm (3 x 6.75 in.) (Dia x L)	ZnS(Ag)	windowless	500-1500	≈ 40%- ²³⁹ Pu	≤ 3 cpm per 10 min count	47-1633

Contamination Monitors

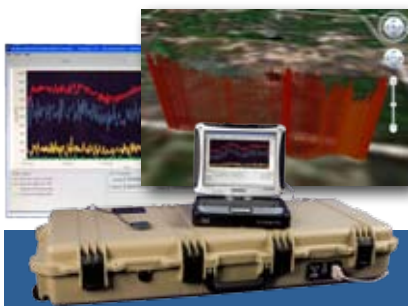


239-1F with Model 12
Floor Monitor

Part Number: 48-1702

Beta Gamma Floor Monitoring

The Model 239-1F Floor Monitor is a gas proportional floor monitor detector mounted on a roll-around cart. The instrument features a flow system, quick-connects, a gas bottle mount, and a means to adjust the height of the detector from the floor for optimum performance. The detector is a 584 cm² gas proportional detector utilizing P-10 counting gas and measures 2.0 x 16.0 x 46.5 cm (0.8 x 6.3 x 18.3 in.) (H x W x L). A counting-gas bottle and gas regulator are not included. The basic system as shown here is equipped with the Model 12 analog ratemeter. Ludlum also offer this floor monitor using other ratemeters equipped with scaler and data logging functionality (see Models 2221, 2224-1, 2241, 2360).



4404-16
Large Area Gamma Monitor

Part Number: 48-3664

Highly Sensitive Detection System with GPS/Data Logging

The Ludlum Model 4404-16 system provides radiation surface measurements to cover large areas either inside or surrounding the plant site. This system is comprised of a large 5.1 x 10.2 x 40.6 cm (2.0 x 4.0 x 16.0 in.) NaI scintillation detector, multichannel electronics, a waterproof enclosure, a ruggedized laptop, and a GPS (Global Positioning System). The software will display the radiation data just like a chart recorder and log the radiation data along with its corresponding GPS coordinates into a comma delimited file. The accompanying software program converts the data files into files suitable for viewing in Google Earth™ or any other 3D earth browser implementing the KML* encoding.

Google Earth™ is a trademark of Google Inc.

* KML (Keyhole Markup Language) is an open standard officially named the OpenGIS® KML Encoding Standard (OGC KML). It is maintained by the Open Geospatial Consortium, Inc. (OGC).



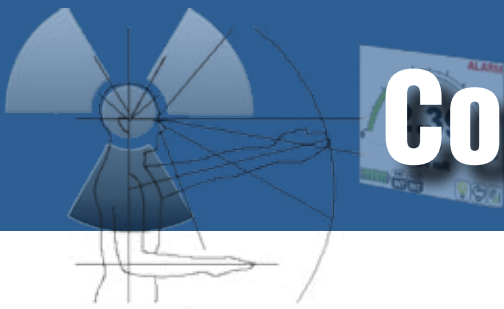
4525-Series
Gate Monitoring System

Gate Monitoring Systems with Ethernet Connectivity

This series of radiation gate monitoring systems represents state-of-the-art technology for detecting orphan sources. The detectors are ruggedized, large 3500 in³ plastic scintillator detectors, each employing dual PM tubes to monitor vehicles entering or exiting the facility. Each gate system can be configured with 2-8 detectors. Data from all the system sensors are acquired and analyzed by powerful, field-tested and time-proven algorithms designed to check each load vigorously in a multi-dimensional, multi-layered manner before declaring them clean.

Any abnormality is immediately alarmed and annunciated both locally and remotely. An optional camera system can capture the image of the offending vehicle and identify to the operator the location of the radioactivity on the image to facilitate a more immediate investigation. The image is included in the logged data for permanent record keeping. Alarms can also be configured to automatically notify shift supervisors by email if desired. Ludlum's gate monitoring system can be configured to accept up to six detectors per lane with up to four lane systems (24 detectors total) all connected to a central computing station.

Contamination Monitors



4906-Series
Hand & Foot Monitor

Hand & Feet Contamination Monitoring

The Model 4906-Series are low-cost, industrial duty, alpha and alpha/beta contamination monitoring systems for checking personnel hands and feet. A large color, touch-screen LCD presents users with the system status and points out any potential contamination. The system employs six proportional detectors with counting activated by optical switches.

Alarms are annunciated locally and can be augmented with optional relays and/or a light stack. The built-in Ethernet interface supports connection to a network for gathering all count cycles and remote monitoring of the status. All maintenance can be performed from the front of the instrument. Detector access for quick replacement or repair is facilitated by hinged top covers.

Model	Detection	Detector Type	Part Number
4906A	Alpha	Air Proportional	48-3687
4906AB	Alpha & Beta	Gas Flow Proportional	48-3688



53
Personnel Portal Monitor

Part Number: 48-3784

Gamma Personnel Portal Monitor

This highly sensitive system detects gamma radiation in or on personnel passing through the portal from either direction. It utilizes eight large plastic scintillation detectors, and is shielded with either the standard 2.5 cm (1 in.) or optional 5 cm (2 in.) of lead. A user-friendly interface guides personnel through the portal monitor via automated voice prompts (customized to any language), and is accompanied with color LCD articulating screens presenting the instrument readiness and status at the ingress and egress. Alarms are manifested both audibly and visually, and can be silenced and acknowledged via convenient control buttons. Three statistical counting modes are available to maximize throughput, maximize sensitivity, or fix the count time. Operational modes include a walk-through mode, a pause mode, and a pause-and-turn mode. Accessible USB ports facilitate connecting a keyboard to implement changes, input user ID, or upload revised software. The system also includes an Ethernet link. Ludlum's optional Universal network software can be used to log instrument status, user activity, and other information from one or more portals.



54
Small Article Monitor

Small Article Contamination Checking

The Model 54 is an all new design incorporating best practices employed over the past couple of decades. This monitor features true 4π counting to provide a more uniform response throughout the large 130.3 L (4.6 ft³) volume, lined in stainless steel. The user-interface is through a large 30.5 cm (12 in.) touch-screen LCD. Ludlum's QPASS counting technology delivers consistent and accurate results in the shortest time. This system is available with either four or six detectors and 2.5 or 5.1 cm (1.0 or 2.0 in.) lead shielding. Options include a second LCD for two-sided operation, a light stack alarm tower, and a weight scale that enables specific activity measurements.

Number of Detectors	Shielding	Part Number
4	2.5 cm (1.0 in.)	48-3728
4	5.1 cm (2.0 in.)	48-3727
6	2.5 cm (1.0 in.)	48-3726
6	5.1 cm (2.0 in.)	48-3263

Area Monitors



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.

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

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 $\mu\text{R/hr}$, mR/hr , R/hr , $\mu\text{Sv/h}$, mSv/h , Sv/h , $\mu\text{rem/hr}$, 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: 0-9999
- High Alarm: red light, 4 beeps/second audible, selectable range: 0-9999
- 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: 95-135 Vac (178-240 Vac available), 50-60 Hz single phase. 6 volt sealed lead-acid rechargeable battery (built in)

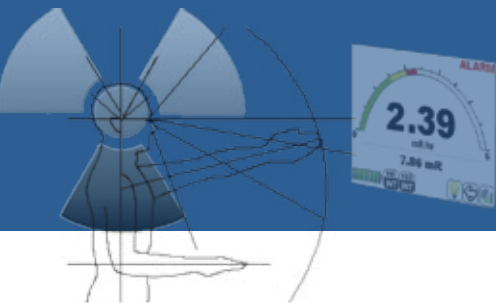
BATTERY LIFE: typically 48 hours in non-alarm condition; 12 hours in alarm condition

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 paint

SIZE: 18.7 x 24.6 x 6.4 cm (7.4 x 9.7 x 2.5 in.) (H x W x D)

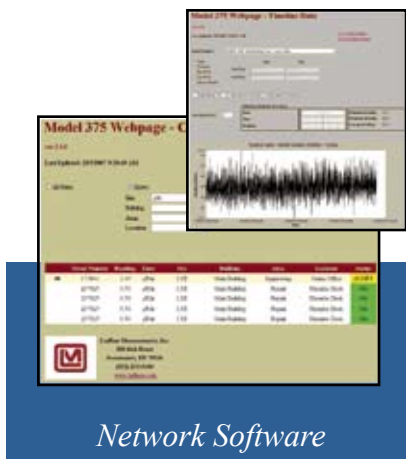
WEIGHT: 2.9 kg (6.5 lb)



Area Monitors

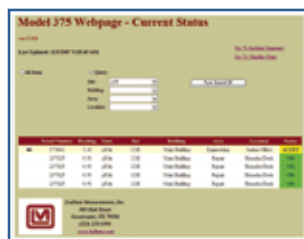
Ethernet Connectivity with a WebPage Interface

Model 375s equipped with the Ethernet option can be connected to a radiation network that collects and displays radiation levels and alarm status in real time from up to 50 area monitors. A standard webpage browser with appropriate authorization can view all data across the network and audibly annunciate any alarms. The system can also be set up to send intelligent email alerts to responsible personnel and capture a picture of whatever triggered an alarm anywhere optional Ethernet cameras are employed.



Network Software

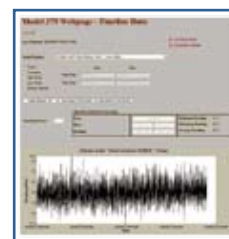
Part Number: 1370-077



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: 2311120



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



Emergency Response

Exposure Meters

microR Meters

Model 2242

Model 25 & 25-1

Model 192

Model 193-6



Traditional

- 0.1 mR/hr-999.9 R/hr
- 7-Decade, Digital Meter
- Dual Energy Compensated GM Detectors
- RS-232 Port



Personal Rad Monitor

- Digital Meter
- Model 25:
 - 0-1000 R/hr Dose Rate
 - 0-1999 R Dose
- Model 25-1:
 - 0.001 mSv/h-10 Sv/h Dose Rate
 - 0-1999 Sv Dose
- Internal Energy Compensated GM Detector
- Adjustable Alarms



2 x 2 inch NaI Detector

- Internal Detector
- Sensitivity: 650 cpm/ μ R/hr
- 4-Decade Analog Meter
- Fast & Slow Response Switch
- Meter Reset



Very Large Scintillator

- External Detector on Pole
- Sensitivity: 1500 cpm/ μ R/hr
- 4-Decade Analog Meter
- Dual Alarm Types for Enhanced Loose Source Detection

Intrinsically Safe Meters

Isotopic Identifiers

Model 3-IS

Model 25-IS

Model 702

Model 703



Versatile Meter

- 4-Decade Analog Meter
- Supports GM & Scintillator Detectors as follows:
 - Model 44-9
 - Model 44-2
 - Model 44-6
 - Model 44-38
 - Model 42-41L



Personal Rad Monitor

- Digital Meter
- 0-1000 R/hr Dose Rate
- 0-1999 R Dose
- Internal Energy Compensated GM Detector
- Adjustable Alarms



2 x 2 inch NaI Detector

- Quick Identification
- Color LCD
- Self Calibrating
- Flash Card Spectra Storage
- Single-Handed Operation
- Gloved-Hand Operable
- Easy to Use



3 x 3 inch NaI Detector

- Quick Identification
- Color LCD
- Self Calibrating
- Flash Card Spectra Storage
- Single-Handed Operation
- Gloved-Hand Operable
- Easy-to-Use

Emergency Response

Emergency Response Kits

Model 14C-RK



Analog Meter

- Ready-to-Go Kit includes:
 - Model 14C Analog Meter with internal GM (0-2000 mR/hr)
 - Model 44-9, GM Pancake Detector
 - Model 44-2, 1 x 1 in. NaI Scintillator Detector
 - Carrying Case
 - Check Source

Model 2241-3RK



Digital Meter

- Ready-to-Go Kit includes:
 - Model 2241 Digital Meter
 - Model 44-9, GM Pancake Detector
 - Model 44-2 1 x 1 in. NaI Scintillator Detector
 - Model 133-7 Energy Compensated GM
 - Carrying Case
 - Check Source



Jumping Into Action

Ludlum offers a wide variety of radiation detection instrumentation to facilitate a rapid response to any radiological type incident. All equipment is designed to withstand rugged handling while delivering reliable measurements. These ready to go packages are also easy to use, allowing the responders to concentrate on their primary tasks.

Portal Monitors

Model 52-1



24 inch wide opening

- Highly Portable
- Sets up in Minutes
- Plastic Scintillator Detectors
- Easy to Operate
- Wheeled transport Case
- Meets FEMA-REP-21

Model 52-1-1



32 inch wide opening

- Highly Portable
- Sets up in Minutes
- Plastic Scintillator Detectors
- Easy to Operate
- Wheeled transport Case
- Meets FEMA-REP-21

Rugged

Reliable

Ready to Go

Easy to Use



Waste Monitors

microR Meters

Model 19



Traditional

- Internal Detector
- Sensitivity: 175 cpm/ μ R/hr
- 5-Decade Analog Meter
- Fast & Slow Response Switch
- Meter Backlight

Model 192



Traditional

- Internal Detector
- Sensitivity: 650 cpm/ μ R/hr
- 4-Decade Analog Meter
- Fast & Slow Response Switch
- Meter Reset

Model 193-6



Traditional

- External Detector on 1.2 m (4 ft) Pole
- Sensitivity: 1500 cpm/ μ R/hr
- 4-Decade Analog Meter
- Dual Alarm Types for Enhanced Loose Source Detection

Model 3 w/44-2



Traditional

- External, Detachable Detector
- Sensitivity: 175 cpm/ μ R/hr
- 4-Decade Analog Meter
- Fast & Slow Response Switch
- Meter Reset

Model	Part Number
19	48-1615
192	48-2945
193-6	48-3063
3 w/44-2	48-1605 47-1532
702	48-3643
703	48-3646

Isotopic Identifiers

Model 702



2 x 2 inch NaI Detector

- Quick Identification
- Sensitivity: 900 cpm/mR/hr
- Color LCD
- Self Calibrating
- Flash Card Spectra Storage
- Single-Handed Operation
- Gloved-Hand Operable
- Easy to Use

Model 703

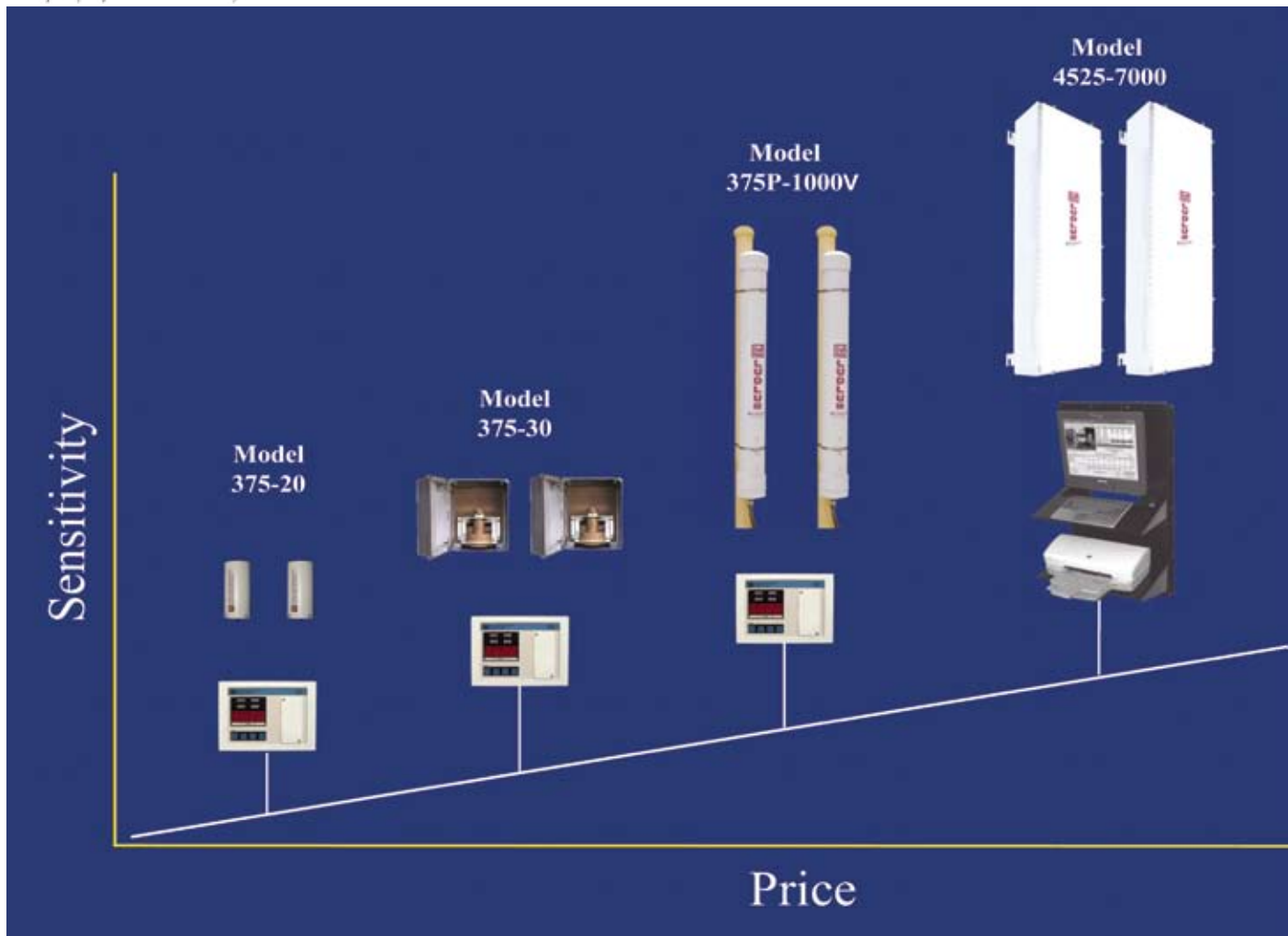


3 x 3 inch NaI Detector

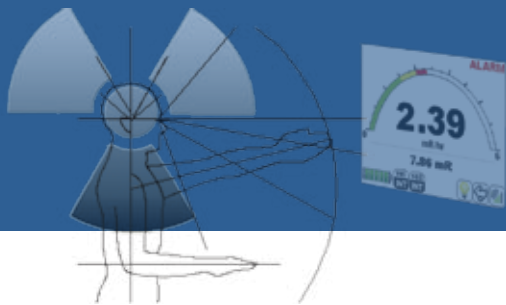
- Quick Identification
- Sensitivity: 2300 cpm/mR/hr
- Color LCD
- Self Calibrating
- Flash Card Spectra Storage
- Single-Handed Operation
- Gloved-Hand Operable
- Easy to Use

Waste Monitors

Portal/Gateway Monitors



Model	Detector (per detector)	Sensitivity ¹³⁷ Cs	Alarm Determination	Controller	Part Number
375-20	5.1 x 5.1 cm (2 x 2 in.) NaI, lead shielded and weather tight housings	16.7 cps/μR/hr	Fixed (Sigma optional)	Model 375	48-3245
375-30	7.6 x 2.5 cm (3 x 1 in.) (Dia x L) shielded NaI(Tl) scintillation detectors in NEMA 4x weathertight enclosures	40 cps/μR/hr	Fixed (Sigma optional)	Model 375	48-2601
375P-1000V	7866 cm ³ (480 in ³) plastic scintillation detectors with 0.32 cm (0.13 in.) lead shielding in weathertight housings	400 cps/μR/hr	Sigma & Sum	Model 375P	48-3782
4525-7000	3500 in ³ of EJ-200 plastic scintillator	1350 cps/μR/hr	Sigma, Sum & Gamma %	Model 4525 Control System	48-3605



Dosimetry

Landauer InLight® Dosimeters

InLight® nanoDot™



Diagnostic/Therapy

- 5 keV-20 MeV
- 10 mRad-1500 Rad
- LLD: 10 mRad
- Unscreened Accuracy: ± 5%
- Screened Accuracy: ± 2%

InLight® Dosimeter



Occupational/Environmental

- 5 keV-20 MeV
- 5 mRem-1000 Rem
- Minimal Reporting:
 - Gamma, Beta, X-ray: 5 mrem
 - Albedo Neutron: 20 mrem

Introduction

Landauer's InLight® series of dosimeters measure beta, gamma, and Albedo neutron radiation exposure with aluminum oxide detectors ($Al_2O_3:C$) read out by optically stimulated luminescence (OSL) technology.

The **nanoDot™** dosimeters facilitate single-point measurements for diagnostic radiology, therapy, or any radiation monitoring application for skin entrance dose assessment.

The **InLight® Dosimeters** come in a variety of configurations to best suit your occupational and environmental needs. Each configuration is comprised of a unique combination of slide component containing aluminum oxide detectors and a filter case. These are then inserted into one of the holder designs to accommodate each application.

The table below presents each dosimeter configuration offered, a corresponding holder, and reader used to obtain the dose measurement. All (99-xxx) numbers are Ludlum part numbers.

Application	Dosimeter	Holders	Applicable Reader(s)
Occupational	Whole Body (99-9806)	Landauer Style (99-9812) Clamshell Style (99-9813)	MicroStar, Auto 200, Auto 500
Occupational	Whole Body Albedo Neutron (99-9807)	Landauer Style (99-9812) Clamshell Style (99-9813)	MicroStar, Auto 200, Auto 500
Occupational	Wrist (99-9809)	Wrist (99-9815)	MicroStar, Auto 200, Auto 500
Environmental	Environmental (99-9908)	Peel & Seal (99-9814)	MicroStar, Auto 200, Auto 500
Diagnostic/Therapy	nanoDot unscreened (99-9810)		MicroStar
Diagnostic/Therapy	nanoDot screened (99-9811)		MicroStar



Landauer Holder Style



Clamshell Holder Style



Peel & Seal Pouch Holder Style



Wrist Holder Style

Dosimetry

Landauer InLight® Readers

MicroStar®



Manual

- Capacity: 1 dosimeter
- Portable
- Bar code input via keyboard, external bar code reader, file upload
- 109 x 327 x 232 mm
4.3 x 12.9 x 9.1 in. (H x W x D)
- 8.03 kg (17.7 lb)
- Part Number: 99-9801

InLight® Auto 200



Automated

- Capacity: 4 cassettes @ 50 each
- Process Rate: 280/hour
- Bar code input internal via optical reader
- 381 x 1118 x 457 mm
(15 x 44 x 18 in.) (H x W x D)
- 34 kg (75 lb)
- Part Number: 99-9802

InLight® Auto 500



Automated

- Capacity: 10 cassettes @ 50 each
- Process Rate: 280/hour
- Bar code input via internal optical reader
- 775 x 1092 x 495 mm
(30.5 x 43 x 19.5 in.) (H x W x D)
- 56.7 kg (125 lb)
- Part Number: 99-9803

Common Features:

- User-Friendly Operation
- Fast 12-second read per dosimeter
- Non-Destructive Readout
- Multiple Dosimeter Configurations
- Meets NVLAP & DOELAP Accreditation Requirements

Reader Introduction

InLight® Systems are turnkey solutions for onsite dosimetry using Landauer's optically stimulated luminescence (OSL) technology. These systems are scalable and can be configured to complement your current dosimetry program, and can enable you to maintain your own in-house accredited dosimetry program.

InLight® readers are exclusively for use with InLight® dosimeters for whole body, environmental, and emergency response monitoring, or any single-point radiation dose measurement (nanoDots™). InLight® dosimeters measure radiation exposure with aluminum oxide detectors ($\text{Al}_2\text{O}_3:\text{C}$) and OSL technology. The readout process uses a light emitting diode (LED) array to

simulate the detectors, and the light emitted by the OSL material is detected and measured by a photomultiplier tube (PMT), using a high-sensitivity photon counting system. The amount of light released during optical stimulation is directly proportional to the radiation dose and the intensity of the stimulation light. The non-destructive OSL readout process of $\text{Al}_2\text{O}_3:\text{C}$ enables reanalysis for dose verification and intermittent analysis, while maintaining total dose accumulation.

InLight® readers include PC menu-driven software that provides control over reader setup, analysis, and data recording, enabling dosimeter readout, reporting, and the monitoring of reader performance. The PC is not included.



Dosimetry



AT-138 Series
Pencil Dosimeter

Direct Reading Pencil Dosimeters

These direct reading dosimeters are rugged instruments that measure accumulated quantities of gamma and X-ray radiation. Applications include personal and environmental monitoring. The low-energy feature has hospital applications including fluoroscopy, portable radiography, and angiography. This pocket size instrument is lightweight and has a sturdy clip to attach to an individual's pocket.

Model	Dose Range	Part Number
AT-138	0-200 mR	51-2936
AT-138S	0-2 mSv	51-2937



AT-909
Pencil Dosimeter Charger

Part Number: 51-2938

Battery Powered Pencil Dosimeter Charger

The Model AT-909 is a compact, lightweight instrument designed to charge the AT-138 Series of direct reading pocket dosimeters. These chargers use a single "D" cell battery capable of recharging dosimeters thousands of times.



The Charger
Pencil Dosimeter Charger

Part Number: 51-2940

Piezoelectric Powered Pencil Dosimeter Charger

The Charger is available for charging the Model AT-138 Series of Pencil Dosimeters. It is designed to zero a variety of quartz and carbon fiber dosimeters simply by squeezing the lever of a piezoelectric generator. This unit does not require batteries.



500-2
Pulse Generator

Part Number: 48-1340

Pulse Generator with Digital Readouts

The Ludlum Model 500-2 Pulse Generator (Pulser) provides the functions necessary for use in calibrating Ludlum instruments, as well as many other scaler/ratemeter instruments. The adjustable output pulse rate is displayed on a three-digit LED readout. Potentiometers (both coarse and fine controls) and a multiplier switch provide rates from 10-9.9 x 10⁶ cpm. Pulse amplitude is controlled by a multiplier switch and a LO/HI potentiometer, while pulse polarity is chosen by a selector switch. Amplitude may be varied between 0 and a negative or positive 5 volts; displayed on a four-digit LED readout. The high voltage of the instrument under test is displayed on a four-digit LED readout.

Plastic Disk Check Sources



Disk Check Sources

Source	Size (diameter x thickness)	Part Number
0.25 µCi ¹³⁷ Cs	2.5 cm x 2.5 mm (1.0 x 0.10 in.)	01-5723
1.0 µCi ¹³⁷ Cs	2.5 cm x 2.5 mm (1.0 x 0.10 in.)	01-5196
5.0 µCi ¹³⁷ Cs	2.5 cm x 2.5 mm (1.0 x 0.10 in.)	01-5186
10 µCi ¹³⁷ Cs	2.5 cm x 2.5 mm (1.0 x 0.10 in.)	01-5231
1.0 µCi ¹³³ Ba	2.5 cm x 2.5 mm (1.0 x 0.10 in.)	01-5818



Mechanical Check Source Holder

Ludlum's traditional mechanical type check source holder is screwed on to the instrument can and has a nice swing-away door that exposes the source whenever needed. The part number for this option is 4062-166.

Thin Plastic Laminate Check Sources with Stick-On Holder

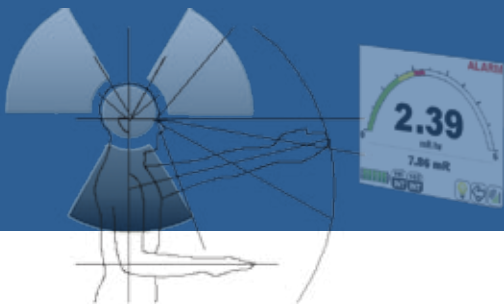
Ludlum recently began shipping new plastic laminate type check sources that are only 0.010 inches thick. They are being used in combination with a new, less costly, industrial strength, stick-on source holder that is easily applied to any instrument. The adhesive type holder is the only one approved for use on any Ludlum intrinsically safe instrument.

The table below presents two of the more common sources including the stick-on holder. Other plastic laminate check source activities and isotopes are also available upon request.



Laminate Sources/Holder

Source/Holder	Size (diameter x thickness)	Part Number
0.25 µCi ¹³⁷ Cs	2.5 cm x 0.25 mm (1.0 x 0.010 in.)	4464-473-02
1.0 µCi ¹³⁷ Cs	2.5 cm x 0.25 mm (1.0 x 0.010 in.)	4464-473-01

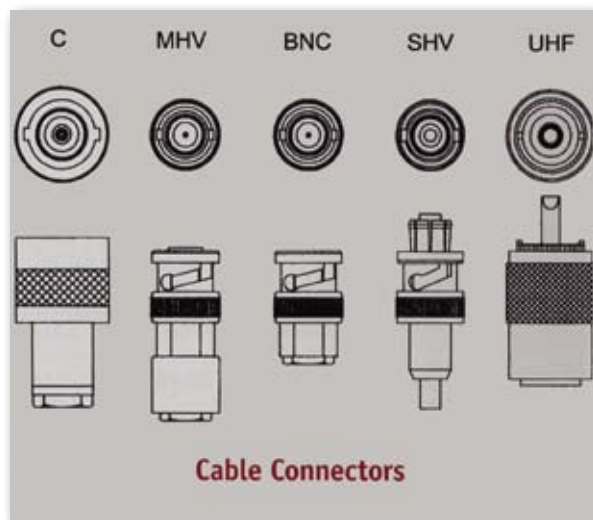


Accessories

Detector Cables

Ludlum offers straight and coiled type cables with either type C, BNC, SHV, MHV, or UHF connectors. Unless specified otherwise, Ludlum survey meters and detectors come equipped with “C” type connectors. When a meter and accompanying probe are ordered as a matched set, Ludlum automatically includes a 99 cm (39 in.) straight type cable with “C” connectors at no additional charge.

Cable Type	Length		Part Number
C Straight	99 cm	39 in.	40-1004
C Straight	152 cm	5 ft	40-1004-5
C Coiled	46-122 cm	18-48 in.	40-1005
BNC Straight	99 cm	39 in.	40-1008
BNC Straight	152 cm	5 ft	40-1008-5
BNC Coiled	46-122 cm	18-48 in.	40-1006
SHV Straight	99 cm	39 in.	8303-134
SHV Straight	152 cm	5 ft	8303-134-5
SHV Coiled	46-122 cm	18-48 in.	8303-521
MHV Straight	99 cm	39 in.	40-1011
MHV Straight	152 cm	5 ft	40-1011-5
MHV Coiled	46-122 cm	18-48 in.	8303-132
UHF Straight	99 cm	39 in.	8303-263
UHF Straight	152 cm	5 ft	8303-263-5
UHF Coiled	46-122 cm	18-48 in.	8303-520



Connectors & Adaptors

ITEM	PART NUMBER
Series C Tee Connector	13-7788
Series BNC Tee Connector	13-7769
Series C-BNC Adaptor	13-7759
Series BNC - C Adaptor	13-7768



296 & 296-1
Signal Switch Box

Model 296 switches between two input signals for a single output. PN:47-1101
 Model 296-1 switches between three signals for a single output. PN: 47-1180
 Both devices are equipped with “C” type connectors.



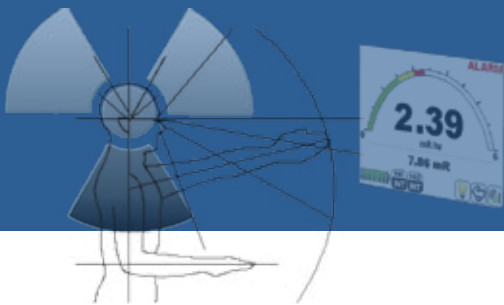
297
Signal Splitter

Separates HV and counting signal.
 Input connector: type “C”
 HV output connector: MHV
 Signal output connector: BNC
 PN: 47-1578



T-1016
HV Divider Box

For use with a digital voltmeter to measure the HV up to 3000 Vdc.
 Detector connector: type “C”
 DVM connector: binding posts
 Impedance: 2.5 Gigohm
 PN: 48-2147



Accessories

Instrument Handles

Ludlum offers a variety of metal handles to go with its line of portable survey meters. The two basic handle types are rolled and flat. The flat handle is designed to accommodate a probe clip for convenient placement of the instrument probe.

Instruments equipped with a scaler function receive a rolled handle with an integrated scaler start button. When a probe clip is also desired, a flat handle with a control button is supplied.



Standard Rolled Handle
PN: 7363-139



Flat Handle
PN: 7363-203



Rolled Handle with Scaler Control
PN: 4408-178



Flat Handle with Scaler Control
PN: 4408-179

Optional Lighted Handle

Replace the standard survey meter handle with this self-contained illuminating handle that shines a white light across the meter face when encountering dark ambient conditions. A three position rocker switch enables turning the light on and off plus a momentary position. The LED light is powered by a single “AA” battery housed inside the handle and will power the light for up to 500 hours.

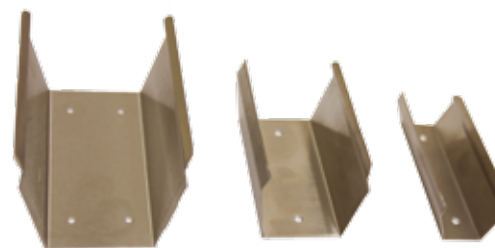


Lighted Handle
PN: 4464-154

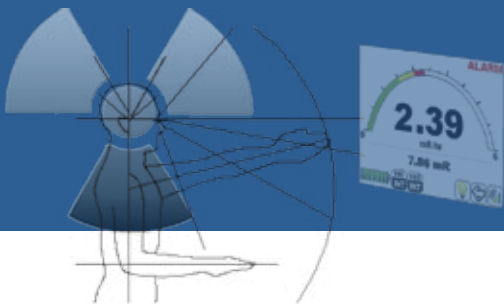
Probe Clips

These simple clips offer great convenience and gripping capability to hold probes to the instrument. They are made from durable stainless so they last a long time.

for Probe Model No.	Clip Part Number
44-7	4010-007-01
44-6, 44-9, 44-38	4010-008-01
44-1, 44-2, 44-3	4002-026-01
133 series	4285-018
44-10, 44-17	4002-020-08
44-88	4002-304
44-40	4283-013



Note: These clips may be mounted to either the instrument handle or side of the case.



Accessories

General Purpose Instrument Cases

Ludlum offers an assortment of cases to facilitate equipment protection, transportation, or are simply looking to keep their radiological apparatus conveniently stored. Both case styles come in varying sizes to best accommodate each particular need.

The **Airmold** case is Ludlum's economy line. The soft shell design is constructed from air-blown ABS plastic and utilizes a foam insert that provides good protection and a convenient place to store all your equipment.

The **Storm** case line has a hard durable shell and foam insert that offers excellent protection and are designed to be air and water tight. These cases are an excellent choice whenever shipping equipment via common carriers and is ideal for shipping GM pancake style probes or other pressurized tubes.

Type	Size	Dimension (H x W x L)	Part No.
Airmold	Small	35.6 x 27.2 x 14.5 cm (14.0 x 10.7 x 5.7 in.)	2310278
Airmold	Medium	43.2 x 33.0 x 19.1 cm (17.0 x 13.0 x 7.5 in.)	2310330
Airmold	Large	62.2 x 33.0 x 19.1 cm (24.5 x 13.0 x 7.5 in.)	2310327



Airmold

Type	Size	Dimension (H x W x L)	Part No.
Storm	Small	33.0 x 23.4 x 15.2 cm (13 x 9.2 x 6.0 in.)	2311062
Storm	Medium	43.2 x 29.7 x 15.7 cm (17.0 x 11.7 x 6.2 in.)	2311063
Storm	Large	55.9 x 43.2 x 20.3 cm (22.0 x 17.0 x 8 in.)	2311064



Storm

Instrument Specific Cases



for Model 78, PN: 2310528



*for Model 12-4
PN: 2310377*



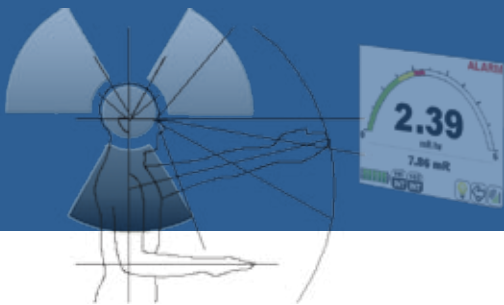
*for Model 2401 Series
PN: 2310517*



*for Model 2401 Series
PN: 2311119*



*for Model 25 Series
PN: 2311773*



Accessories

Headset

This headset offers comfort and excellent protection against noisy areas whenever it becomes necessary to listen to the audio output from portable survey meters. This headset plugs into any Ludlum survey meter equipped with an audio output jack. Part Number: 47-3708



Shoulder Strap

Lighten your burden and free up your hands with a shoulder harness that easily attaches to the meter. Part Number: 4363-413

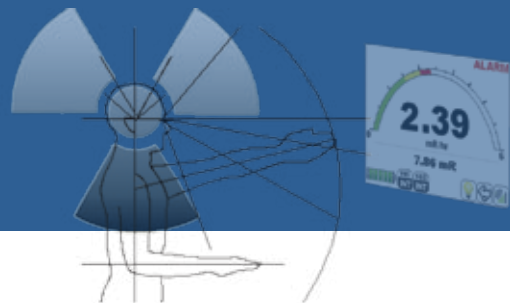


Collimator Shields

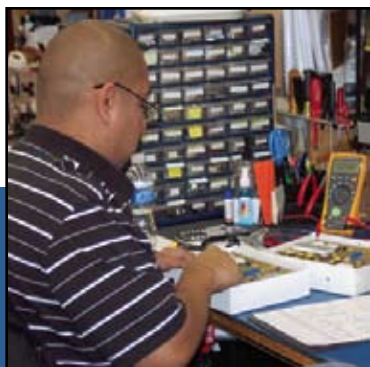


Ludlum offers a number of collimators for its gamma series detectors to accommodate a wide variety of applications. All collimators are constructed from lead (99% Lead & 1 % Antimony) and are coated with splatter beige powder coat paint.

for Detector Model	External Dimensions	ID	Active Opening	Shielding	Weight	Part Number
44-10, 44-22	3.125 Dia. x 2.5 in.	2.665 in.	2.0 in.	0.23 in.	2.0 lb	4260-076
44-10, 44-22	3.125 Dia. x 6.0 in.	2.665 in.	2.0 in.	0.23 in.	5.1 lb	4260-079
44-10	3.125 Dia. x 2.5 in.	2.650 in.	1.5 x 1.5 in. opening on outer perimeter wall	0.23 in.	2.6 lb	4260-085
44-2, 44-2-5	2.37 Dia. x 3 in.	1.91 in.	1.91 in.	0.23 in.	2.3 lb	4002-227
44-2	2.63 Dia. x 1.875 in.	1.9 in.	1.0 in.	0.365 in.	6.6 lb	4002-084-08
44-2	2.135 Dia. x 2.0 in.	1.9 in.	1.9 in.	0.118 in.	1.5 lb	7002-107
44-20	2.38 Dia. x 4.0 in.	1.9 in.	1.9 in.	0.24 in.	4.5 lb	7032-051
44-11	2.812 Dia. x 2.5 in.	2.332 in.	2.0 in.	0.24 in.	2.0 lb	4260-120



Support Services



Repair

Our facility offers a full-service repair and calibration department. We not only repair and calibrate our own instruments but most other manufacturers' instruments as well. Repair estimates are offered at no cost, and repair and modification charges are based on material cost plus labor. Labor rates are billed for actual time at the currently published rates.



Calibration

Ludlum performs NIST traceable calibrations with compliance to ANSI N323. Standard instrument calibrations supply as-found readings and two points per range calibration for a single detector setup. Most special multi-detector and multi-source calibrations can also be performed on Ludlum designed instrumentation as well as many instruments manufactured by others.

Visit our website to view the current rates.



Training

Ludlum offers an intensive two-day training course that involves calibration, repair, and maintenance on Ludlum manufactured instruments. LMI offers this training at no charge at our facility in Sweetwater, Texas. Accommodations and meals must be provided by the attendees. Training is usually scheduled around mid-month, but other times can be accommodated especially for groups of four or more. Training is also offered at locations around the country in the spring and fall (see list of scheduled classes on our website). If you are interested in signing up for this training, please contact Randy Smith or Carlos Chapa at Ludlum Measurements, Inc. at 800-622-0828 toll free or 325-235-5494.



Model No. Index

<u>Model</u>	<u>Page #</u>	<u>Model</u>	<u>Page #</u>	<u>Model</u>	<u>Page #</u>	<u>Model</u>	<u>Page #</u>
3	16	43-44-1	21	133-7	23	2221	18
3 w/44-2	11, 36	43-65	21	133-8	23	2224-1	18
3 w/44-9	9	43-68	24	177-Series	20	2241-3	18
3 w/44-38	9	43-78	29	180-Series	28	2241-3RK	35
3-97	14	43-78-1	29	180-8	29	2241-4	12
3-98	14	43-78-2	29	182	29	2242	9, 34
3-IS	13, 17, 34	43-92	21	192	11,34,36	2350-1	19
3-IS-1	13	43-93	24	193 w/44-2	11	2360	19
5	9	44-1	23	193 w/44-10	11	2363 w/42-41L	12
6	8	44-2	22	193-6	11, 34, 36	2401-EC	8
9-3	10	44-3	22	239-1F w/12	30	2401-EC2	8
9-4	10	44-6	25	252	4, 33	2401-ECX	8
9-7	10	44-7	24	271	32	2401-EW	9
9-7-BH	10	44-9	24	272	32	2401-P	9
9-7-BM	10	44-9Exp	5	272D	32	2401-S	11
9-7-LD	10	44-9Dose	5	375	32	2403	16
9DP	5, 10	44-10	22	375 Camera Option	33	3030	26
12	16	44-11	22	375 NEMA Option	33	3030E	28
12-4	12	44-17	22	375 Printer Option	33	3030E w/43-10-1	26
14C	16	44-20	22	375 Strobe Options	33	3030P	26
14C-RK	35	44-21	25	375 Network Soft.	33	4404-16	30
15	12	44-38	25	375/1	32	4525-7000	37
16	17	44-40	24	375/2	32	4525-Series	30
18	17	44-62	22	375/4	32	4906A	31
19 & 19A	11, 36	44-88	24	375/9	32	4906AB	31
25	34	44-92	25	375-10	32	AT-138	40
25-1	34	44-98	25	375-20	37	AT-138S	40
25-IS	13, 34	44-110	25	375-30	37	AT-909	40
25-IS-1	13	44-110-2	6, 29	375P-1000V	37	Accessories	42
42-31H	23	44-142	23	500-2	41	Check Sources	41
42-41L	23	44-183	6, 22	702	15, 34, 36	Collimators	45
43-1	21	52-1	35	702-1	15	Detector Cables	42
43-1-1	24	52-1-1	35	703	15, 34, 36	Handles	43
43-2	21	53	4, 31	703-1	15	Headset	45
43-2-2	24	54	4, 31	711	15	InLight Dosimetry	38,38
43-5	21	78	14	711-1	15	Instrument Cases	44
43-9	29	78-1	14	720	5, 33	Planchets	27
43-10	29	120	29	2000	28	Probe Clips	43
43-10-1	29	133-2	22	2000 w/203	27	Shoulder Strap	45
43-40-2	21	133-4	22	2100-Series	27	Signal Splitters	42
43-40-3	21	133-6	23	2200 & 2200 w/243	27, 28	The Charger	40



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December 2010
Edition