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**LUDLUM MODEL 43-143  
GAS PROPORTIONAL DETECTOR**

**November 2011  
Serial Number PR308161 and Succeeding  
Serial Numbers**

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GAS PROPORTIONAL DETECTORS**

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**LUDLUM MEASUREMENTS, INC.**  
501 OAK STREET, P.O. BOX 810  
SWEETWATER, TEXAS 79556  
325-235-5494, FAX: 325-235-4672

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## **STATEMENT OF WARRANTY**

Ludlum Measurements, Inc. warrants the products covered in this manual 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 to determine if repair, recalibration, or replacement is required.

This warranty excludes the replacement of photomultiplier tubes, G-M 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 any implied warranty of merchantability or fitness, which extend beyond the description of the face there of. If the product does not perform as warranted herein, purchaser's sole remedy shall be repair or replacement, at the option of Ludlum Measurements. 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.

## **RETURN OF GOODS TO MANUFACTURER**

If equipment needs to be returned to Ludlum Measurements, Inc. for repair or calibration, please send to the address below. All shipments should include documentation containing return shipping address, customer name, telephone number, description of service requested, and all other necessary information. Your cooperation will expedite the return of your equipment.

**LUDLUM MEASUREMENTS, INC.  
ATTN: REPAIR DEPARTMENT  
501 OAK STREET  
SWEETWATER, TX 79556**

**800-622-0828 325-235-5494  
FAX 325-235-4672**

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## **General**

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The Ludlum Model 43-143 is a gas proportional detector with an active window area of 100 cm<sup>2</sup>. It is designed for alpha and/or beta survey and is compatible with a number of counting instruments.

Counting gas for the detector is supplied through a special MHV coaxial cable. The length of the cable can be changed, but only the MHV connectors may be used. An additional gas input adaptor is required for injecting gas into the cable. Gas is exhausted from the detector through a small hole in the body of the detector. The exhaust gas cannot be captured and measured.

The metalized polyester window of the detector can be quickly changed by sliding the outer bracket off of the instrument.

**NOTE:** *When changing the metalized polyester window on a detector, it is not necessary to recalibrate the instrument as long as a functional check is performed on the instrument and its readings are consistent with the readings before the window was replaced.*

## Specifications

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Window Thickness: typically two layers of metalized polyester (0.8 mg/cm<sup>2</sup>), other thicknesses available

Window Area: typically 100 cm<sup>2</sup> active, 70 cm<sup>2</sup> open

Counting Gas: P-10 (10% methane, 90% argon) is recommended. Other counting gases are also acceptable. Typical flush rate is 150 cc/min. Typical continuous is 30-50 cc/min.

Gas Connectors: Gas is fed through the coax cable, MHV only. If gas injection connection is required for cable, use LMI part number 4342-195.

Background:

- Alpha is 3 counts per minute (cpm) or less when operating at alpha-only plateau region.
- Beta-gamma is typically 350 cpm or less (in a 10μR/hr field).

### **Efficiency (4π geometry):**

- typical values for gross counting: 20% for <sup>239</sup>Pu; 15% for <sup>14</sup>C; 30% for <sup>99</sup>Tc; 20% for <sup>90</sup>Sr/<sup>90</sup>Y
- typical values for alpha-beta counting: 17.5% for <sup>239</sup>Pu; 20% for <sup>99</sup>Tc; 20% for <sup>90</sup>Sr/<sup>90</sup>Y



## *Model 43-143 Gas Proportional Detector*

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Operating Voltage:

- Alpha is typically 1100-1400 V.
- Beta-gamma is typically 1600-1800 V.

Counter Threshold Setting: typically 2-5 mV for scaler or gross counting instrument

Size: 8.4 x 11.9 x 15.5 cm (3.3 x 4.7 x 6.1 in.) (H x W x L)

Weight: 0.59 kg (1.3 lb)

## **Gas Connection**

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### **RECOMMENDED EQUIPMENT**

- (1) A gas adaptor is required to inject gas into the cable.  
Use LMI part number 4342-195 or equivalent.
- (2) **Dual-Stage Regulator:** allows for better low-pressure regulation.
- (3) **Needle Valve** between second regulator stage and flowmeter for easier flow adjustment.
- (4) **Flowmeter:** range of 0-150 cc/min (cubic centimeters/minute).
- (5) **Water Pressure Gauge:** (optional) range of 0-25 inches of water.

## **Flush and Operation**

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- Connect cable to detector.
- Connect gas adapter (4342-195 or equivalent) to end of cable.
- Connect input gas line from gas adapter to main supply through the regulator and input flow meter.
- Turn main supply on and flush detector at 100-150 cc/min at 1-2 psi gauge pressure for 15 minutes.
- After flush is complete, set flow to 30-50 cc/min.

## **Detector Performance**

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**ALPHA PLATEAU:** Determine the plateau region of the background and alpha source counting curves for the applied voltage range of 1100-1400 V. Use 50-volt increments and set the counting instrument input sensitivity at 4 mV. The operating voltage should be approximately 1250 V. The background count should be 3 cpm or less. The operating voltage will increase with a higher input sensitivity. Check each quadrant of the detector face for statistically uniform response; that is, ensure that each quadrant reading is within 10% of the average of the readings. If the count is not statistically uniform, check for light leaks in the window and repeat flush procedures.

**BETA-GAMMA PLATEAU:** Determine the plateau region in the background and beta-gamma source counting curves for the applied voltage range of 1550-1900 V or from 1550 V to when either the source or background count rate increases dramatically. Use 50-volt increments and leave the input sensitivity at 4 mV. The operating voltage should be approximately 1700-1750 V, with the background count at 350 cpm or less. Setting instrument input sensitivity greater than 4 mV will increase the operating voltage.

## **Parts List**

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<u>Qty.</u>	<u>Description</u>	<u>Part Number</u>
	Assembled Unit – Model 43-143 Gas Proportional Detector	47-3887
12 ea.	Stndoff-1102-23-0110 BLK	18-8807
28 in.	Buss Wire #26 BWA-2601	03-5391
1.63 ft	Cord-.070 Silicone 20D	22-9863
1 ea.	Model 43-143 Mylar Window Assy	4342-186
1 ea.	Model 43-143 Body	7342-184
1 ea.	Model 43-143 Cover	7342-187
1 ea.	Model 43-143 Handle	7342-188
1 ea.	Model 43-143 Screen-Bent	7342-189-01
1 ea.	Model 43-143 Screen-Flat	7342-189
1 ea.	Model 43-143 MHV Conn Mod	7342-198

# Drawings and Diagrams

Model 43-143 Assembly View, Drawing 342 x 191A

