

**LUDLUM MODEL 43-143-1
GAS PROPORTIONAL DETECTOR**

**August 2018
Serial Number PR308161 and Succeeding
Serial Numbers**

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General

The Ludlum Model 43-143-1 is a gas proportional detector with an active window area of 100 cm². 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 an barb type connector. 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

Window Thickness: typically two layers of metalized polyester (0.8 mg/cm²), other thicknesses available

Window Area: typically 100 cm² active, 70 cm² 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 barb connector.

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

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

RECOMMENDED EQUIPMENT

- (1) **Dual-Stage Regulator:** allows for better low-pressure regulation.
- (2) **Needle Valve** between second regulator stage and flowmeter for easier flow adjustment.
- (3) **Flowmeter:** range of 0-150 cc/min (cubic centimeters/minute).
- (4) **Water Pressure Gauge:** (optional) range of 0-25 inches of water.

Flush and Operation

- Connect cable to detector.
- 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

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

| <u>Qty.</u> | <u>Description</u> | <u>Part Number</u> |
|-------------|--|--------------------|
| | Assembled Unit – Model 43-143-1 Gas Proportional Detector | 47-4011 |
| 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 43-143-1 Body | 7342-203 |
| 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. | FTG 1/8 inch Barb Connector | 22-9213 |

Drawings and Diagrams

Model 43-143-1 Assembly View, Drawing 342 x 202

