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ORDELA MODEL 8600A LARGE-AREA PROPORTIONAL COUNTER

DESCRIPTION

The ORDELA Model 8600A is a windowless, multi-wire proportional-counter system designed and manufactured by ORDELA, Inc. for the detection and counting of ultra low-level alpha surface contamination on large-area samples (31.7 cm x 31.7 cm area). The Model 8600A system contains, as integral parts, the proportional counter, a sample chamber, pulse shaping and discriminator electronics, low-voltage bias supplies, and high-voltage power supply. The proportional counter operates with P-10 (90% Argon + 10% Methane) in the flow mode at atmospheric pressure. The standard system is powered from 100-240 VAC 50/60 Hz line power. The output provides a positive TTL pulse for each detected alpha particle. A pulse counting system and a regulated P-10 gas supply are additional accessories required for operation and measurement. ORDELA, Inc. recommends its Model 8600DAS data acquisition system which includes hardware and Windows® based software to support up to four Model 8600A detectors for pulse counting, data storage, and report generation.

The proportional counter, sample chamber, and electronics measure 46 cm wide x 53 cm deep x 17 cm high. The counter enclosure is aluminum for protection and EMI shielding (Fig. 1). The electronics are integrated in the bottom of the counter enclosure. The sample-chamber access is located on the front of the proportional-counter enclosure, just above the electronics enclosure. Several Model 8600A systems may be stacked and operated on top of each other to conserve laboratory bench space. The optional Model 8600DAS acquires data simultaneously and independently from up to four Model 8600A counter systems.

The active volume of the proportional counter has a 38 cm x 38 cm sensitive area and is 7 cm deep. It is surrounded by a copper clad cathode liner to minimize alpha background. The windowless entrance cathode is a metal wire grid for optimum alpha particle transmission, low background, elimination of contamination and expensive window replacement. All components of the cathode/anode assembly are removable for easy cleaning and decontamination or replacement. The sample trays are interchangeable and may be replaced if background contamination levels become excessive. The maximum sample area that can be accommodated on the trays is 32 cm x 32 cm. The maximum sample thickness may vary from 0.25 to 1 cm with no manual sample tray height adjustment required. A novel approach for sample preparation was developed to mitigate contamination problems of the proportional counter and sample trays from powdered samples. These samples may be covered with - or enclosed in a pouch of - thin, metalized Mylar film (0.2 mg/cm²). The alpha background count rate of the Model 8600A system with blank samples in the sample chamber is <4 counts per hour* with the discriminator set to accept alpha particles with energies between 3 and 11 MeV. The detection efficiency is approximately 90% of the 2 π solid angle of the sample intercepted by the proportional counter.

The electronics enclosure contains the pulse processing circuits, a regulated low-voltage power supply, and the high-voltage power supply for biasing the proportional-counter anode. The pulse processing circuit contains a preamplifier, shaping amplifier, window discriminator, and output driver. All bias voltages are adjustable by internal controls. The upper level discriminator is set to 11 MeV.

*Typical backgrounds may vary from 2-10 counts per hour, depending upon ambient radon concentrations, interfering electric fields, altitude, and purity of counting gas.

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SPECIFICATIONS

ACTIVE SAMPLING AREA:	1008 cm ² (31.75 cm x 31.75 cm)
COUNTING VOLUME:	38 cm wide x 38 cm deep x 7 cm high
BACKGROUND:	<0.004 counts per hour/cm ² for 3 - 11 MeV alphas*
ALPHA EFFICIENCY:	90% of 2 π solid angle intercepted
COUNTING GAS:	Research grade P-10 (90% Argon + 10% Methane) gas flow at atmospheric pressure. Integral flowmeter monitors out-gas flow in the range of 20-100 sccm.
GAS FLOW RATE:	80 sccm operating; 120 sccm to purge within four hours
ENTRANCE CATHODE:	Cu wire grid
ANODE BIAS VOLTAGE:	~1000 V (positive), internally set
CONTROLS:	Power (ON/OFF)
OUTPUT:	TTL pulses (4 V pulse height, 1 μ s duration)
COUNTING GAS VOLUME:	Approximately 15 liters
POWER:	100-240 VAC 50/60 Hz

COUNTER CONSTRUCTION

COUNTING VOLUME:	"O" ring sealed enclosure
BODY MATERIAL:	Aluminum
OVERALL DIMENSIONS:	45.6 cm width, 17.2 cm height, and 47 cm depth
WEIGHT:	15 kg (shipping weight 25 kg)
SAMPLE CHAMBER:	"O" ring sealed enclosure, closed with two toggle clamps

ACCESSORIES

Standard accessories installed within the Model 8600A are:

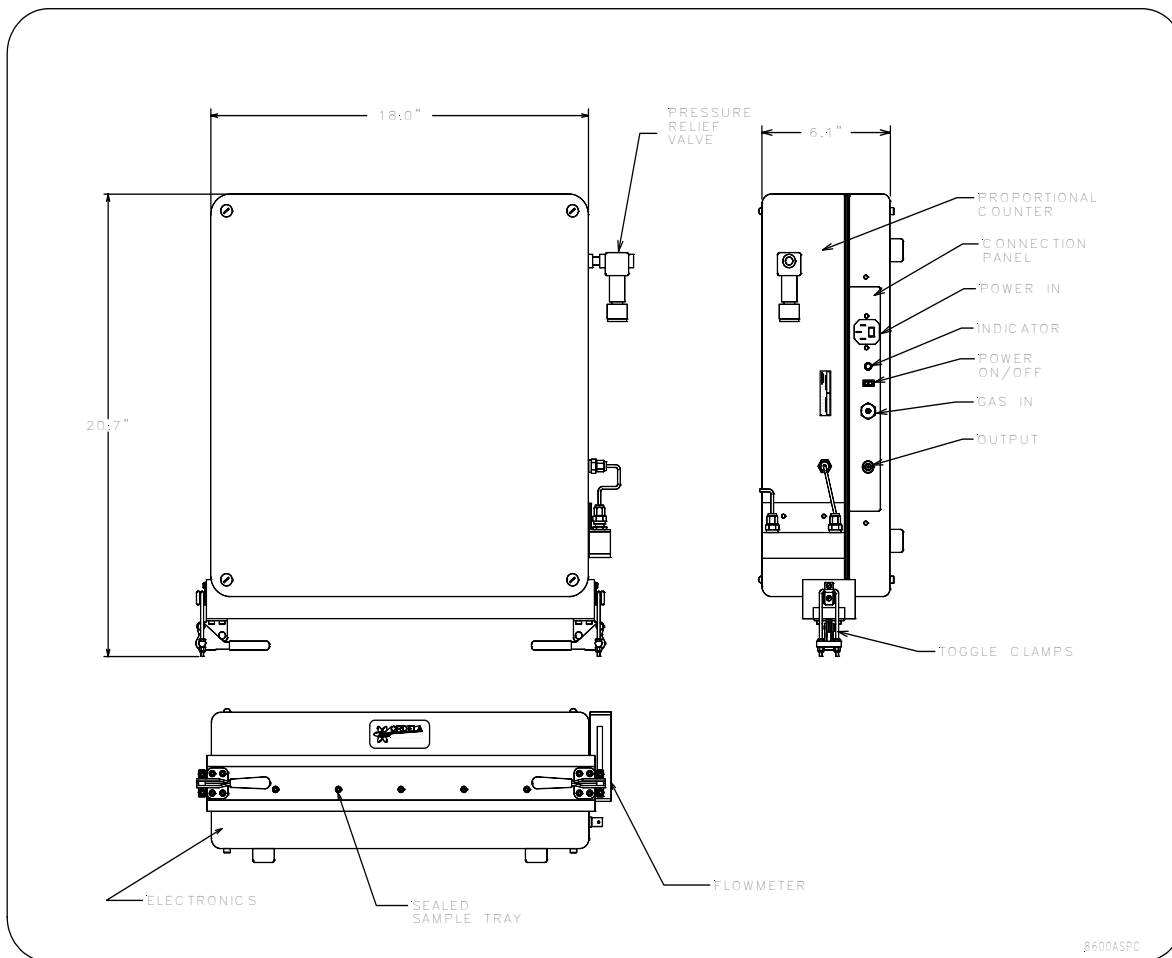
1. One (1) electronics module consisting of a low-noise preamplifier, shaping amplifier, and window discriminator, all in the counter enclosure.
2. One (1) high-voltage power supply, factory set at 1300V, and a high-voltage filter circuit for biasing the proportional-counter anode. One ± 5 V power supply for biasing the electronics module, and one +24V power supply for biasing the high-voltage supply, all in the counter enclosure.
3. One (1) internal gas distribution circuit.

Accessories delivered with the Model 8600A:

1. One (1) set of 3 m-long power- and signal-interconnection cables.

Optional Accessories:

1. One (1) ORDELA Model 8600DAS, PC-based 4-channel software.
2. Power sample tray, 500 cm² active area x 3 mm deep. Fits inside the standard, included, sample tray. Mylar, to lessen possibility of contamination, is held in place over the powder sample tray by a unique "O" ring retaining system.
3. Lead counting reference sample. An ORDELA exclusive, the 500 cm² lead sample fits inside the standard counting tray and provides an effective way to periodically verify instrument operation.
4. Two-stage, low-pressure P-10 gas regulator.



ORDELA Model 8600A outline and dimensions

WARRANTY

ORDELA, Inc. warrants its products to be free from defects in materials and workmanship for 12 months after shipment. No other warranty is included. Specifically, no warranty of merchantability or fitness for a particular purpose is implied. ORDELA's liability under this warranty is limited to repairing or replacing the product at ORDELA's option. This warranty is void if the product is operated improperly, disassembled, or modified other than in the ORDELA laboratory.