

Ultra High Performance Alpha/Beta Counting Systems  
for Maximum Laboratory Productivity



# Alpha/Beta Counting Manual Systems

ORTEC offers a full suite of **MANUAL** alpha/beta counters incorporating either gas-flow proportional detector or dual-phosphor scintillation detector technologies. These manual, single detector systems are ideally suited for applications requiring **long count times for a small number of samples**.

The following Application Guide can be used to select the optimal Manual system for your specific market application as well as provide information regarding key features for each model.

Manual Systems	Recommended Applications					Model Features				
	HP	SC	RC	CL	NP+	GL	LB	ULB	WL	GC
ORT-MPC-900-DP	✓	✓				✓				✓
ORT-MPC-900-GFL, GFW	✓	✓							✓	✓
ORT-MPC-1000-GFL, GFW	✓	✓						✓	✓	
Application Key <b>HP</b> = Health Physics; <b>SC</b> = Smear Counting; <b>RC</b> = Radiochemistry; <b>CL</b> = General Counting Labs; <b>NP+</b> = Nuclear Power, Fuel Cycle, Decommissioning and Disposal										

## Features Key

### GL – Gasless Systems

These systems do not require any connection to P-10 counting gas. They operate totally independent of any external supply other than power, making them more portable than other counting systems.

### LB – Low Background Systems

These systems offer great performance delivering beta backgrounds less than 2 CPM and alpha less than ½ CPM. The larger size detectors are the major contributors for the higher backgrounds.

### ULB – Ultra-Low Background Systems

Ultra-low level alpha/beta counting systems usually refer to those with beta background counts in the 1–2 CPM or lower range for systems with a two inch detector. All two inch ultra-low level systems have total background performance of 1.0 CPM or better.

### WL – Windowless Systems

Windowless alpha/beta counting systems offer one very distinct and important benefit, increased counting efficiency. Without the barrier formed by the window, and because the sample is actually placed in the active volume of the detector, counting efficiency can increase tremendously. Also, because the sample is in the active volume of the detector, there is no air gap present, and counting efficiency is far less dependent on planchet depth. A windowless system can reach a lower MDA in the same counting time as a windowed system, or reach the same MDA in a shorter amount of time.

### GC – Gross Counting Systems

The term gross counter has several accepted meanings. In this application, gross alpha/beta counting systems are those that do not have ultra-low level background performance. Specifically, these systems do not have low beta background performance. However, the alpha background of these systems is usually equal to the alpha background of high performance systems. Gross counters are often used for remote locations, and where high beta counting sensitivity is not required.

# Alpha/Beta Counting Manual Systems

## ORT-MPC-900-DP and ORT-MPC-900-DP-G Manual Single Sample Gross Counter

- Dual Phosphor Scintillation Detector
- Touch Screen Interface
- Lightweight Portability
- 2 in. (5.1 cm) Standard Planchet Diameter
- Radon Compensation for Air Filters
- Optional Anti-Coincidence Scintillation Guard Detector
- Optional Lead Shielding to Reduce Background Levels
- Includes PIC Link Cable and 2 ea. 5/16 in. Sample Carriers

The ORT-MPC-900-DP is a convenient and versatile “benchtop” counter equipped with a dual phosphor scintillator type detector that supports gasless operation and easy portability. Cosmic background radiation reduction is possible with the optional Anti-Coincidence Guard Detector (ORT-MPC-900-DP-G). DUO Express software allows for easy system programming, data management, and control chart maintenance. Multiple instruments can be connected for user convenience. This sample counter is ideal for standard Health Physics applications such as smears and air filters.



### Specifications

Optimized for Lower Energy Betas				
Typical Efficiency				
Source	Top	1/8" Bottom	1/4" Bottom	5/16" Bottom
Pu-239	41%	34%	27%	24%
SrY-90	53%	46%	39%	37%
Tc-99	34%	28%	24%	22%
Background				
Condition	Warranted (CPM)		Typical (CPM)	
	Alpha	Beta	Alpha	Beta
With Lead and Guard	<0.2	<25	0.05	20
With Guard, No Lead	<0.2	<30	0.06	27
With Lead, No Guard	<0.2	<55	0.09	43
No Guard or Lead	<0.2	<65	0.08	49

Optimized for Higher Energy Betas				
Typical Efficiency				
Source	Top	1/8" Bottom	1/4" Bottom	5/16" Bottom
Pu-239	40%	33%	27%	24%
SrY-90	50%	43%	37%	35%
Tc-99	27%	22%	19%	17%
Background				
Condition	Warranted (CPM)		Typical (CPM)	
	Alpha	Beta	Alpha	Beta
With Lead and Guard	<0.2	<25	0.05	15
With Guard, No Lead	<0.2	<30	0.05	19
With Lead, No Guard	<0.2	<55	0.05	34
No Guard or Lead	<0.2	<65	0.05	39

Physical	
Sample Detector	2 in. (5.1 cm) diameter, ZnS + plastic dual phosphor
Sample Size	2 in. (5.1 cm) diameter, 1/8, 1/4, 5/16 in. (3.2, 6.3, 7.9 mm) deep
Capacity	1
Depth	1/8, 1/4, or 5/16 inch
Data Export	USB Flash Drive, USB PIC Link
Interface	Touch Screen
Count Modes	Alpha Only, Alpha/Beta Simultaneously, Alpha then Beta
Power	110–240 V AC, 50–60 Hz Input
Window	Aluminized, 80 µg/cm <sup>2</sup>
Operating Temperature	10°C to 40°C (50°F to 104°F)
Dimension (HxWxD)	20.25 x 9 x 16 in. (51.4 x 22.9 x 40.6 cm)
Weight	40 lb., Guard +7 lb., Shield +50 lb.

Options	Model
1/8 inch Planchet	PIC-700-0007
1/4 inch Planchet	PIC-700-0008
5/16 inch Planchet	PIC-700-0009
Lead Ring	ORT-MPC-900-SHLD

# Alpha/Beta Counting Manual Systems

## ORT-MPC-900-GFW-2 and ORT-MPC-900-GFL-2 Manual Single Sample Gross Counter

- Hemispherical Gas Flow Detector
- Counting Gas Loss Detection
- Touch Screen Interface
- Lightweight Portability
- Gas Conservation
- 2 in. (5.1 cm) Standard Planchet Diameter
- Radon Compensation for Air Filters
- Window or Windowless Operation
- Optional Lead Shielding to Reduce Background Levels
- Includes PIC Link Cable and 2 ea. 5/16 in. Sample Carriers

The ORT-MPC-900-GFW-2 and ORT-MPC-900-GFL-2 are convenient and versatile benchtop counters equipped with hemispherical gas-flow proportional type detectors that support easy portability. These sample counters are ideal for standard health physics applications such as smears and air filters. They can also be used for radiochemistry applications when alpha only counting is of interest. The ORT-MPC-900-GFL-2 uses a windowless gas-flow proportional detector that delivers higher efficiencies for projects involving alpha emitters and higher activity low-energy beta emitters. Each counter has the ability to program routines and QC charts on a PC running the included DUO Express software, then transfer the routines to the instrument using a direct-connect PIC Link cable.



### Specifications

With Window (GFW)				
Typical Efficiency				
Source	Top	1/8" Bottom	1/4" Bottom	5/16" Bottom
Pu-239	40%	32%	26%	24%
SrY-90	55%	48%	40%	37%
Tc-99	47%	37%	30%	27%
Background				
Condition	Warranted (CPM)		Typical (CPM)	
	Alpha	Beta	Alpha	Beta
Without Lead	<0.1	<55	0.05	40
With Lead	<0.1	<45	0.05	30

Windowless (GFL)				
Typical Efficiency				
Source	Top	1/8" Bottom	1/4" Bottom	5/16" Bottom
Pu-239	47%	47%	47%	47%
SrY-90	60%	62%	62%	62%
Tc-99	58%	58%	58%	58%
Background				
Condition	Warranted (CPM)		Typical (CPM)	
	Alpha	Beta	Alpha	Beta
Without Lead	<0.1	<55	0.05	40
With Lead	<0.1	<45	0.05	30

Physical	
Sample Detector	2.25 in. (5.7 cm) diameter, hemispherical style gas flow proportional
Sample Size	2 in. (5.1 cm) diameter, 1/8, 1/4, 5/16 in. (3.2, 6.3, 7.9 mm) deep
Capacity	1
Depth	1/8, 1/4, or 5/16 inch
Data Export	USB Flash Drive, USB PIC Link
Interface	Touch Screen
Count Modes	Alpha Only, Alpha/Beta Simultaneously, Alpha then Beta
Power	110–240 V AC, 50–60 Hz Input
Window	Aluminized, 80 µg/cm <sup>2</sup>
Counting Gas	P-10, 60 cc/min at 10 psi
Gas-Pro	Fail-safe P-10 monitoring system senses breaches in gas flow
Operating Temperature	10°C to 40°C (50°F to 104°F)
Dimension (HxWxD)	20.25 x 9 x 16 in. (51.4 x 22.9 x 40.6 cm)
Weight	40 lb., Shield +50 lb.

Options	Model
1/8 inch Planchet	PIC-700-0007
1/4 inch Planchet	PIC-700-0008
5/16 inch Planchet	PIC-700-0009



# Alpha/Beta Counting Manual Systems

## ORT-MPC-1000-GFW-2 and ORT-MPC-1000-GFL-2 Manual Single Sample Changer

- 2 in. (5.1 cm) Standard Planchet Diameter
- Windowless or Windowed Hemispherical Gas Flow Detector
- Cosmic Guard Detector
- Counting Gas Loss Detection
- Low Background Counter
- Touch Screen Interface
- Gas Conservation



The ORT-MPC-1000-GFW-2 and ORT-MPC-1000-GFL-2 single detector manual counters are the most versatile, high-performance, low background counters available. These counters provide new labs a cost effective entry into low background alpha/beta counting until sample volumes grow larger and justify either multi-detector systems or automatic counters. The ORT-MPC-1000-GFL-2 with a windowless gas flow detector delivers higher efficiencies for projects involving alpha emitters and higher activity low-energy beta emitters. Each counter has the ability to program routines and QC charts on a PC running the included DUO Express software, then transfer the routines to the instrument using a direct-connect PIC Link cable.

### Specifications

Physical	
Sample Detector	2.25 in. (5.7 cm) diameter, hemispherical style gas flow proportional
Window	MPC-1000-GFW-2: Aluminized, 80 $\mu\text{g}/\text{cm}^2$ MPC-1000-GFL-2: Windowless
Guard Detector	1 large area gas flow proportional
Counting Gas	MPC-1000-GFW-2: P-10, 60 cc/min at 10 psi MPC-1000-GFL-2: P-10, 150 cc/min at 10 psi
Gas-PRO	Fail-safe P-10 monitoring system senses breaches in gas flow
Shielding	4 in. (10 cm) thick lead
Sample Size	2 in. (5.1 cm) diameter planchets, 1/8, 1/4, 5/16 in. (3.2, 6.3, 7.9 mm) deep
Count Modes	Alpha only, Alpha/Beta simultaneously
Interface	Touch screen
Data Export	RS-232, USB
Power	117 V AC, <0.2 A, 50/60 Hz 230 V AC, <1.0 A, 50/60 Hz
Environment	10°C–40°C (50°F–104°F) 20%–90% humidity, non-condensing
Dimensions	23 x 24 in. (58.4 x 61 cm)
Weight	380 lb (172 kg)

Performance		
Typical Background		
Alpha	0.05 cpm (warranted 0.1 cpm)	
Beta	0.7 cpm (warranted 0.9 cpm)	
Typical Efficiency		
	MPC-1000-GFW-2 (Windowed)	MPC-1000-GFL-2 (Windowless)
$^{210}\text{Po}$	40%	45%
$^{241}\text{Am}$	40%	45%
$^{230}\text{Th}$	40%	45%
$^{90}\text{Sr}/^{90}\text{Y}$	55%	55%
$^{99}\text{Tc}$	35%	45%
$^{137}\text{Cs}$	40%	45%
Cross Talk		
Alpha-Beta	<0.1%	
Beta-Alpha	<0.1%	

Options	Model
Cart	PIC-120-0011
Steel Carrier (set of 10), 1/8 in.	PIC-140-0115SS-1/8
Steel Carrier (set of 10), 1/4 in.	PIC-140-0115SS-1/4
Steel Carrier (set of 10), 5/16 in	PIC-140-0115SS-5/16
Planchet, 2 inch x 1/8 inch, set of 100	PIC-700-0007
Planchet, 2 inch x 1/4 inch, set of 100	PIC-700-0008
Planchet, 2 inch x 5/16 inch, set of 100	PIC-700-0009
Radiochemistry Applications Software	ORT-VISTA 2000

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