

# ORTEC®

## AlphaSuite

All-In-One Integrated Alpha Spectrometers



“Advanced Digital Alpha Spectrometers  
to Meet Every Counting Laboratory Need.”

**AMETEK®**  
ADVANCED MEASUREMENT TECHNOLOGY

# AlphaSuite

With the Alpha Suite range of integrated Alpha Spectrometers, ORTEC is able to address the needs of ANY counting laboratory, large or small, upgrading or just starting out. The latest advanced digital design, together with a modular mechanical approach, aligns value and performance with unparalleled configuration flexibility. Any of these spectrometers may be added to existing ORTEC systems simply by installing the latest drivers included with the instrument.

## All Alpha Suite models feature the following:

- A complete instrument requiring vacuum, power and connection to a PC only.
- Simple, high speed USB connection to computer.
- Internal advanced DIGITAL MCA.
- Digital Spectrum Stabilizer.
- Computer controlled preamplifier, HV supply, and calibration pulser.
- High Quality Nickel-plated Brass Vacuum chamber, easily decontaminated
- Optional Alpha Recoil protection system available.
- Compatible with all previous ORTEC Alpha Spectrometer Systems.
- MAESTRO® MCA Emulation Software.

## Alpha Aria®

A single alpha spectroscopy channel in a 2-wide NIM chassis. The digital MCA is built right in, so a USB connection is all that is needed to start counting. A simple to operate PUMP/HOLD/VENT control is mounted on the front panel. The Alpha Aria is easy to add to existing NIM installations.



## Alpha Duo®

Benchtop dual alpha spectrometer with two alpha spectroscopy channels. Each unit includes 100% fully computer controlled vacuum measurement, variable detector bias supply (switchable positive or negative), preamplifier, test pulse generator with variable amplitude, and a leakage current monitor. The Alpha Duo has dedicated independent MCAs to optimize processing time.

## Alpha Mega®

Benchtop single alpha spectrometer with sample chamber designed for filters up to 4.18 inches (106 mm) in diameter. Based upon the Alpha Duo, but capable of sampling much larger samples and using large diameter detectors, it has all the same quality features and is fully computer controlled. The Alpha Mega is available in benchtop form, or as an option in our Alpha Ensemble chassis.



## Alpha Ensemble®

Modular alpha spectroscopy system which may be configured with up to 4 modules in any combination of ALPHA-DUO-M1 and/or ALPHA-MEGA-M1 expansion modules. Each alpha spectroscopy module includes a vacuum gauge, variable detector bias supply (switchable positive or negative), preamplifier, test pulse generator with variable amplitude, self-controlled RCAP, and a leakage current monitor.

Each expansion module has a separate vacuum control within an Alpha Ensemble configuration. The Alpha Ensemble may be either rack mounted or left in the table-top mounting enclosure in which it is supplied. In the Alpha Ensemble configuration, an internal USB hub provides connection via a single cable to the user's PC. Each detection system has individual digital offset and conversion gain settings for maximum flexibility.

## Specifications – Common to All Models

### Vacuum Chamber

<b>Construction</b>	Cast brass, nickel-plated for ease of decontamination.
<b>Maximum Sample Size</b>	Aria and Duo: 51 mm (2.030 in.) Mega: 106 mm (4.18 in.)
<b>Maximum Sample-to-Detector Spacing</b>	44 mm, in increments of 4 mm.
<b>Maximum Detector Size</b>	Aria and Duo: 1200 mm <sup>2</sup> . Mega: 3000 mm <sup>2</sup> . (Consult Factory)
<b>Detector Connector Type</b>	Rear Microdot (ORTEC B mount).
<b>Vacuum Manifold Connector</b>	Aria, Duo, and Mega: 0.25" Swagelok tube fitting. Ensemble: NW25.
<b>Vacuum Pump Requirements</b>	Rotary vacuum pump, 6.7 CFM (190 L/min) displacement, with oil mist trap. The ORTEC ALPHA-PPS-115 (or -230) is available for this application.

### System Performance

Based on use with a BU-017-450-100 ULTRA™ Series detector with a good-quality <sup>241</sup>Am point source.

<b>Energy Resolution</b>	≤20 keV (FWHM) with a detector-to-source spacing equal to the detector diameter.
<b>Detector Efficiency</b>	≥25% is achievable with close detector-to-source spacing.
<b>Background</b>	Above 3 MeV, ≤1 count/hour based on a BU-020-450-AS detector.

### Electronics

#### Bias Supply

Range	0 ±100 V, 10 μA; voltage can be read by the computer.
Bias	Computer controlled, adjustable in 1 V increments.
Pos/Neg	Polarity can be selected independently with PWB slide switches (factory set for positive bias voltage).
Enable/Disable	By computer control.
Indicator	Front-panel, red LED for each channel shows if the bias is on.

#### Calibration Pulser

Range	0 to 10 MeV.
Pulser	Computer controls the internal pulser amplitude with 12 bit (2.5 keV) level settings; set to a nominal 7-MeV pulse when shipped.
Frequency	100 Hz.
Frequency Stability	≤±50 ppm/°C.
Amplitude Drift	≤±150 ppm/°C.
Long Term Drift	≤±0.005% of full scale/24 hours at constant temperature.
ON/OFF	Computer controlled.
Indicator	Front-panel, BIAS red LED flashes when pulser is on.

## Specifications – Common to All Models – continued

### Electronics – continued

<b>Detector Current Monitor</b>	
Range	0 to 10,000 nA; read by computer.
Display Resolution	3 nA.
<b>Preamplifier</b>	
Charge Sensitive	Nominally 10 mV/MeV.
Pos/Neg	Polarity can be selected independently with PWB slide switches.
<b>Digital MCA</b>	
Digital Filter	1 $\mu$ s unipolar equivalent.
Conversion Gain	Software-selectable as 256, 512, 1024, 2048, or 4096, independent for each segment.
Fine Gain	Software-selectable range from 0.25 to 1.
Digital Offset	Software-selectable range from 0 to conversion gain setting (4096 max) in 1 channel increments.
Display Channels	Software-selectable range from 0 to (conversion gain – digital offset).
Digital Spectrum Stabilizer	Controlled via computer.
Dead-Time Correction	Extended live-time correction according to the Gedcke-Hale method.
<b>Software Controls</b>	
ADC LLD	Computer controlled from 0 to 100% full scale.
ADC ULD	Computer controlled from 0 to 100% full scale.
<b>Indicators (front panel)</b>	
ADC Busy	Red LED flashes once for each digitized pulse.
<b>Presets</b>	
Real Time/Live Time	Multiples of 20 ms.
Region of Interest	Peak count/Integral count.
Data Overflow	Terminates acquisition when any channel exceeds $2^{31-1}$ .
<b>Interface Connectors</b>	
High Speed USB	Rear panel standard “B” type USB connector.

### Computer Prerequisites

Any computer capable of running any of the following operating systems: Windows XP SP3 and Windows 7 32- or 64-bit.

## Specifications – Model Specific

### Alpha Aria

A single alpha spectroscopy channel in a NIM chassis. Each unit includes a variable detector bias supply (switchable positive or negative), a preamplifier, and a test pulse generator with variable amplitude.

<b>Vacuum Control</b>	3-position Pump/Vent/Hold valve, front-panel mounted.
<b>Recoil Protection (RCAP) Option</b>	No built-in pressure controller. Requires RCAP-2-120V or RCAP-2-240V.

#### Electrical and Mechanical

Dimensions	2.7 in. W x 11.9 in. D x 8.7 in. H in a double-wide NIM chassis.
Net Weight	1.9 kg (4.2 lb).
Shipping Weight	2.3 kg (7.3 lb).
Power Input	NIM power. +6 V @ 315 mA, +12 V @ 50 mA, -12 V @ 75 mA, +24 V @ 50 mA.
Power Consumption	5 W input power.
Operating Environment	0° to 50°C. Up to 95% relative humidity, non-condensing.

### Alpha Duo

Benchtop dual alpha spectrometer with two alpha spectroscopy channels. Each unit includes a vacuum gauge, variable detector bias supply (switchable positive or negative), preamplifier, test pulse generator with variable amplitude, and a leakage current monitor.

<b>Vacuum Control</b>	Via computer for each Alpha Duo module.
<b>Vacuum Gauge Range</b>	200 mTorr to 20 Torr, read by computer.
<b>Recoil Protection (RCAP) Option</b>	Built-in pressure controller, requires addition of optional biased sample holders only.
<b>RCAP Controller Range</b>	1 Torr to 13 Torr, read by computer. Regulation Target Pressure $\pm 10\%$ .

#### Electrical and Mechanical

Dimensions	10.1 in. W x 14.4 in. D x 6.0 in. H enclosure.
Net Weight	7.5 kg (16.5 lb).
Shipping Weight	11.5 kg (25.0 lb).
Power Input	120/240 V ac, 50/60 Hz.
Power Consumption	10 W input power.
Operating Environment	0° to 50°C. Up to 95% relative humidity, non-condensing.

### Alpha Mega

Benchtop single large alpha spectrometer. Includes a vacuum gauge, variable detector bias supply (switchable positive or negative), preamplifier, test pulse generator with variable amplitude, and a leakage current monitor.

<b>Vacuum Control</b>	Via computer.
<b>Vacuum Gauge Range</b>	200 mTorr to 20 Torr, read by computer.
<b>Recoil Protection (RCAP) Option</b>	No built-in pressure controller. Requires RCAP-2-120V or RCAP-2-240V.

#### Electrical and Mechanical

Dimensions	10.1 in. W x 14.4 in. D x 6.0 in. H enclosure.
Net Weight	8.5 kg (18.7 lb).
Shipping Weight	11.5 kg (25.0 lb).
Power Input	120/240 V ac, 50/60 Hz.
Power Consumption	10 W input power.
Operating Environment	0° to 50°C. Up to 95% relative humidity, non-condensing.

### Alpha Ensemble

Modular alpha spectroscopy system which may be configured with up to 4 modules in any combination of ALPHA-DUO-M1 and/or ALPHA-MEGA-M1 expansion modules. Each alpha spectroscopy module includes a vacuum gauge, variable detector bias supply (switchable positive or negative), preamplifier, test pulse generator with variable amplitude, self-controlled RCAP, and a leakage current monitor. Each expansion module has a separate vacuum control within an Alpha Ensemble configuration.

The Alpha Ensemble may be either rack mounted or left in the table-top mounting enclosure in which it is supplied.

Each instrument is supplied with a full set of blank panels as needed to cover unoccupied expansion space.

<b>Vacuum Control</b>	Via computer for each module installed.
<b>Vacuum Gauge Range</b>	200 mTorr to 20 Torr, read by computer.
<b>Recoil Protection (RCAP) Option</b>	Built-in pressure controller. Requires addition of optional biased sample holders. For use with ALPHA-DUO-M1 module only.
<b>RCAP Controller Range</b>	1 Torr to 13 Torr, read by computer. Regulation Target Pressure $\pm 10\%$ .

#### Electrical and Mechanical

Dimensions	19.0 in. W x 19.4 in. D x 10.7 in. H enclosure
Net Weight	(with 4 expansion modules): 26.6 kg (58.4 lb).
Shipping Weight	(with 4 expansion modules): 29.5 kg (65.0 lb)
Power Input	120/240 V ac, 50/60 Hz.
Power Consumption	50 W input power.
Operating Environment	0° to 50°C. Up to 95% relative humidity, non-condensing.

## Ordering Information

### Step 1. Choose one or more Alpha Spectrometers.

Model	Description
<b>ALPHA-ARIA</b>	Single input NIM spectrometer. Includes one ENS-ST-1, USB Cable and MAESTRO software.
<b>ALPHA-DUO</b>	Dual input benchtop spectrometer. Includes two each ENS-ST-1, one each ENS-ST-KK, one each ENS-CG, USB Cable and MAESTRO software
<b>ALPHA-MEGA</b>	Single input benchtop spectrometer for up to 4" samples. Includes one each MEGA-ST, one each MEGA-CG, MAESTRO Software and USB cable.
<b>ALPHA-ENSEMBLE-2</b>	2 input benchtop spectrometer (one ALPHA-DUO-M1 module). Includes one each ENS-ST-KK, one each ENS-CG, USB Cable and MAESTRO software
<b>ALPHA-ENSEMBLE-4</b>	4 input benchtop spectrometer (two ALPHA-DUO-M1 modules). Includes one each ENS-ST-KK, one each ENS-CG, USB Cable and MAESTRO software.
<b>ALPHA-ENSEMBLE-6</b>	6 input benchtop spectrometer (three ALPHA-DUO-M1 modules). Includes one each ENS-ST-KK, one each ENS-CG, USB Cable and MAESTRO software.
<b>ALPHA-ENSEMBLE-8</b>	8 input benchtop spectrometer, (four ALPHA-DUO-M1 modules). Includes one each ENS-ST-KK, one each ENS-CG, USB Cable and MAESTRO software.
<b>ALPHA-ENSEMBLE-1M</b>	Single input benchtop spectrometer (one ALPHA-MEGA-M1 module). Includes one each MEGA-CG, MAESTRO Software and USB cable.
<b>ALPHA-ENSEMBLE-2M</b>	2 input benchtop spectrometer (two ALPHA-MEGA-M1 modules). Includes one each MEGA-CG, MAESTRO Software and USB cable.
<b>ALPHA-ENSEMBLE-3M</b>	3 input benchtop spectrometer (three ALPHA-MEGA-M1 modules). Includes one each MEGA-CG, MAESTRO Software and USB cable.
<b>ALPHA-ENSEMBLE-4M</b>	4 input benchtop spectrometer (four ALPHA-MEGA-M1 modules). Includes one each MEGA-CG, MAESTRO Software and USB cable.
<b>ALPHA-ENSEMBLE-1D-1M</b>	3 input benchtop spectrometer (one ALPHA-DUO-M1 module and one ALPHA-MEGA-M1 module). Includes one each ENS-ST-KK, one each ENS-CG, one each MEGA-CG, MAESTRO Software and USB cable.
<b>ALPHA-ENSEMBLE-1D-2M</b>	4 input benchtop spectrometer (one ALPHA-DUO-M1 module and two ALPHA-MEGA-M1 modules). Includes one each ENS-ST-KK, one each ENS-CG, one each MEGA-CG, MAESTRO Software and USB cable.
<b>ALPHA-ENSEMBLE-1D-3M</b>	5 input benchtop spectrometer (one ALPHA-DUO-M1 module and three ALPHA-MEGA-M1 modules). Includes one each ENS-ST-KK, one each ENS-CG, one each MEGA-CG, MAESTRO Software and USB cable.
<b>ALPHA-ENSEMBLE-2D-1M</b>	5 input benchtop spectrometer (two ALPHA-DUO-M1 modules and one ALPHA-MEGA-M1 module). Includes one each ENS-ST-KK, one each ENS-CG, one each MEGA-CG, MAESTRO Software and USB cable.
<b>ALPHA-ENSEMBLE-2D-2M</b>	6 input benchtop spectrometer (two ALPHA-DUO-M1 modules and two ALPHA-MEGA-M1 modules). Includes one each ENS-ST-KK, one each ENS-CG, one each MEGA-CG, MAESTRO Software and USB cable.
<b>ALPHA-ENSEMBLE-3D-1M</b>	7 input benchtop spectrometer (three ALPHA-DUO-M1 modules and one ALPHA-MEGA-M1 module). Includes one each ENS-ST-KK, one each ENS-CG, one each MEGA-CG, MAESTRO Software and USB cable.

## Ordering Information – continued

### Step 2. For each spectrometer chosen, specify type and quantity of detectors from the following list.

Note: Compatible Spare Detector models that are not installed and system tested include the ULTRA-AS and Low-Background R Series with B-Mount and ENS8 (8-pack) models. Factory verification is required for all other detector models.

Model	Description
ENS-U300	300 mm <sup>2</sup> low-background ULTRA-AS detector for Alpha Suite spectrometer, installed and system tested.
ENS-U450	450 mm <sup>2</sup> low-background ULTRA-AS detector for Alpha Suite spectrometer, installed and system tested.
ENS-U490	490 mm <sup>2</sup> low-background ULTRA-AS detector for Alpha Suite spectrometer, installed and system tested.
ENS-U600	600 mm <sup>2</sup> low-background ULTRA-AS detector for Alpha Suite spectrometer, installed and system tested.
ENS-U900	900 mm <sup>2</sup> low-background ULTRA-AS detector for Alpha Suite spectrometer, installed and system tested.
ENS-U1200	1200 mm <sup>2</sup> low-background ULTRA-AS detector for Alpha Suite spectrometer, installed and system tested.
ENS-U2000	2000 mm <sup>2</sup> low-background ULTRA-AS detector for Alpha Suite spectrometer, installed and system tested.
ENS-U3000	3000 mm <sup>2</sup> low-background ULTRA-AS detector for Alpha Suite spectrometer, installed and system tested.
ENS-R300	300 mm <sup>2</sup> low-background Ruggedized detector for Alpha Suite spectrometer, installed and system tested.
ENS-R450	450 mm <sup>2</sup> low-background Ruggedized detector for Alpha Suite spectrometer, installed and system tested.
ENS-R600	600 mm <sup>2</sup> low-background Ruggedized detector for Alpha Suite spectrometer, installed and system tested.
ENS-R900	900 mm <sup>2</sup> low-background Ruggedized detector for Alpha Suite spectrometer, installed and system tested.

**ENS8 (8-Pack) ULTRA-AS detectors** can only be ordered in conjunction with an ALPHA-ENSEMBLE-8 system including 8 each ENS-model detectors at full price. Customer may then order one set of ENS8 model spare detectors per ALPHA-ENSEMBLE-8 system including 8 each ENS- detectors at full price ordered. Spare detectors ordered must be the same size as or smaller than the 8 each ENS- model detectors ordered at full price with the ALPHA-ENSEMBLE-8 system.

ENS8U300	8-Pack of 300 mm <sup>2</sup> ULTRA-AS Detectors.
ENS8U450	8-Pack of 450 mm <sup>2</sup> ULTRA-AS Detectors.
ENS8U490	8-Pack of 490 mm <sup>2</sup> ULTRA-AS Detectors.
ENS8U600	8-Pack of 600 mm <sup>2</sup> ULTRA-AS Detectors.
ENS8U900	8-Pack of 900 mm <sup>2</sup> ULTRA-AS Detectors.
ENS8U1200	8-Pack of 1200 mm <sup>2</sup> ULTRA-AS Detectors.

### STEP 3. Specify options and accessories if needed:

Model	Description
ALPHA-PPS-115	Portable Pump Station, 115 V.
ALPHA-PPS-230	Portable Pump Station, 230 V.
ENS-ST-1	Sample Tray for Aria and Duo. Fits 3/4 and 1 inch samples.
ENS-ST-2	Sample Tray for Aria and Duo. Fits 1/2 and 7/8 inch samples.
ENS-ST-3	Sample Tray for Aria and Duo. Fits 1.25 and 1.5 inch samples.
ENS-ST-4	Sample Tray for Aria and Duo. Fits 1.75 and 2 inch samples.
ENS-ST-KK	Set of Sample Trays for Aria and Duo. One each of all four (1/2 through 2 inch).
ENS-CG	Chamber Door O-Rings for Aria and Duo. Package of 10.
ENS-RACKMOUNT	Installed 19" Rackmount, must be ordered with ALPHA-ENSEMBLE.
ENS-RM-KIT	19" Rackmount Kit for Alpha Ensemble, not installed.
MEGA-CG	Chamber Door O-Rings for Mega. Package of 5.
MEGA-ST	Sample Tray for Mega. Fits sample sizes up to 4.18 inches (106 mm). Includes Spring Loaded Filter Retainer.
RCAP-ST	Biased Sample tray assembly for recoil protection use. Fits Aria and Duo. (One per chamber required.)
A36-BW	AlphaVision® Alpha Analysis Software (primary single use license).
A36-NW	AlphaVision Network Copy (for networked systems in addition to the first).

### Expansion Modules for Alpha Ensemble

ALPHA-DUO-M1	Dual input Alpha Ensemble expansion spectrometer. Includes two each ENS-ST-1.
ALPHA-MEGA-M1	Single input Alpha Ensemble expansion spectrometer for samples up to 4.18 inches (106 mm). Includes one each MEGA-ST.

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## Compatible Spare Detectors (not installed or system tested)

Compatible Spare Detector models that are not installed and system tested include the ULTRA-AS and Low-Background R Series with B-Mount and ENS8 (8-pack) models. Factory verification is required for all other detector models.

Model	Description
<b>ULTRA-AS Ion Implanted Detectors in B Mount</b>	
BU-019-300-AS	300 mm <sup>2</sup> low-background ULTRA-AS detector.
BU-020-450-AS	450 mm <sup>2</sup> low-background ULTRA-AS detector.
BU-020-490-AS	490 mm <sup>2</sup> low-background ULTRA-AS detector.
BU-024-600-AS	600 mm <sup>2</sup> low-background ULTRA-AS detector.
BU-029-900-AS	900 mm <sup>2</sup> low-background ULTRA-AS detector.
BU-037-1200-AS	1200 mm <sup>2</sup> low-background ULTRA-AS detector.
BU-053-2000-AS	2000 mm <sup>2</sup> low-background ULTRA-AS detector.
BU-064-3000-AS	3000 mm <sup>2</sup> low-background ULTRA-AS detector.
<b>Low-Background (“SEE-NO-ALPHA”) R Series in B Mount</b>	
BR-SNA-300-100	300 mm <sup>2</sup> low-background Ruggedized detector.
BR-SNA-450-100	450 mm <sup>2</sup> low-background Ruggedized detector.
BR-SNA-600-100	600 mm <sup>2</sup> low-background Ruggedized detector.
BR-SNA-900-100	900 mm <sup>2</sup> low-background Ruggedized detector.

Specifications subject to change.  
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