



# Product Information



# System 4004X X-ray Spectrometer

## Premium Performance at an Affordable Price

- Amplifier, MCA and bias supply, all in one package.
- Includes Quantum MCA™ software.
- Optional Excalibur Quantitative Analysis software available.
- No PC slots or reserved memory required
- Easy installation and setup.

The System 4004X is a complete X-ray spectrometer in a single integrated package, configured with 4000 channels of spectrum memory, a  $\pm 1.2$  KV bias supply, and an analog pulse processor with 2 $\mu$ s, 12 $\mu$ s and 24 $\mu$ s shaping times. It also has onboard Ethernet and RS-232 interfaces to make connection to the PC or network easy.

### High Performance for X-ray Applications

The System 4004X X-ray spectrometer has been engineered to give optimum performance with HPGc and Si(Li) X-ray detectors. The three computer selectable time constants offer choices for high throughput applications, standard operation, and highest possible resolution. The shaping amplifier features 8th order triangular and Gaussian filters for minimum series noise and optimum resolution.

Automatic noise discriminators and a gated baseline restorer with rate adaptive restoration give the ultimate in stability even at the highest count rates. To provide the best possible pile-up rejection even at the lowest energies, the fast channel has adaptive time constants which ensure maximum possible sensitivity. This translates into the best possible performance from your detector system. Computer control of all hardware functions also complements the power and flexibility of the system.

The System 4004X has 15 dedicated TTL ROI outputs and one ROI byte with strobe. The ROI outputs can be directed to counters or rate meters for monitoring individual regions or peaks.



### Software

For qualitative analysis, the System 4004X includes Quantum MCA™ software at no additional charge. This package features an intuitive, user-friendly, interface. The main screen is not cluttered with buttons and controls. Tool-tips allow frequently used functions to be quickly and easily identified. There are also default parameters for the peak search routine and other steps of the analysis process.

For the user that likes control of the analytical process, Quantum MCA will be a pleasure to use. The Tools Setup window allows the fine-tuning of parameters associated with the peak search. Some of these controls include peak search sensitivity and ROI definitions. Each spectrum data file contains all information associated with the calibration that was in effect at the time of acquisition.

For quantitative analysis the Excalibur software option provides X-ray specific libraries and an analytical engine incorporating modelling, deconvolution, and standards-based as well as standardless analysis.

### Computer and Network Connectivity

Quantum MCA has a single hardware setup and search utility that establishes communication with PGT multichannel analyzers via Ethernet or RS-232. Ethernet capability allows users to enjoy the benefits of connecting to laboratory instruments from PC's on the local area network. The RS-232 interface allows a quick and simple method of connecting the System 4004X directly to a PC in the field or other location where Ethernet is not available. For RS-232, an unused COM port is all that is needed.

# System 4004X Description

## • Amplifier

- Gaussian and triangular shaping of Unipolar pulses (PC selectable)
- Acceptable input: pos./neg. pulses (step or tail) with rise times of 10ns to 500ns and decay times from  $< 50\mu\text{s}$  to infinity.
- Input: single-ended (BNC) or differential (BNC) (PC selectable)
- Shaping constants (PC selectable)
  - $2\mu\text{s}$ ,  $12\mu\text{s}$  or  $24\mu\text{s}$
- Pole-zero provided for Resistive feedback type preamplifiers
- Pole-zero adjustment assistant eliminates need for oscilloscope
- Gain: from 4X to 1300X (PC control)
- Coarse gain: 4X, 8X, 32X, 64X, 128X, 256X, 512X
- Fine gain: 1 to 2.55X in increments of 0.0007X
- Common mode rejection ratio:  $> 500$  (typically  $> 1000$ )
- Temperature instability:
  - Gain: guaranteed  $\leq \pm 50$  ppm/ $^{\circ}\text{C}$ , typical  $< 25$  ppm/ $^{\circ}\text{C}$ , 0 to  $50^{\circ}\text{C}$
  - Offset: guaranteed  $\pm 10$  mV/ $^{\circ}\text{C}$
- Noise:  $< \pm 0.05\%$  (typical  $< \pm 0.025\%$ )
- Baseline restorer:
  - slow channel: rate adaptive with automatic threshold
  - fast channel with automatic threshold
- Live-time correction modes: simple busy, Lowes, Gedcke-Hale, external

## • ADC

- 8.12 $\mu\text{s}$  successive approximation ADC (14-bit resolution)
- Discriminators (PC adjusted): upper (0 to 105% of full scale) and lower (0 to 105% of full scale) in 0.41% increments
- Zero adjustment in increments of 0.41% (PC adjusted)

## • Spectrum Memory

- 256, 1012, 2048, 4096 Channels
- maximum counts per channel:  $2^{31} - 1$

## • Non-linearity:

- Differential non-linearity:  $< \pm 1\%$  over top 99% of range
- Integral non-linearity:  $< \pm 0.05\%$  over top 99% of range

## • Counting presets

- Real time
  - Live time
- Integral of all ROI's
  - Integral of selected ROI's
- Gross ROI statistics
  - Net ROI statistics
- Total system counts
  - Total SCA counts

## • Battery backup for

- Spectrum
- Setup parameters
- Clock memory

## • Computer Control

- Ethernet 10/100 base T
- RS-232 baud rates: 2400, 9600, 19200, 38400, 57600, 115200
- Max. number units connected to PC: 8

## • Bias Supply

- 0 to  $\pm 1.2$  KV
- External shutdown capability (positive-true or negative-true polarity)
- Ripple: 20mV peak-to-peak
- Temperature instability:  $\pm 0.01\%$  /  $^{\circ}\text{C}$ , 0 to  $50^{\circ}\text{C}$
- Bias polarity: internally jumper selected

## • Front panel indicators

- LED's for: Acquire, Event, Serial Com, AUX I/O in-use, power, shaping-constant, bias-on, polarity, fault, PUR
- Dead time meter: 3-color LED array

## • Rear panel controls and connectors

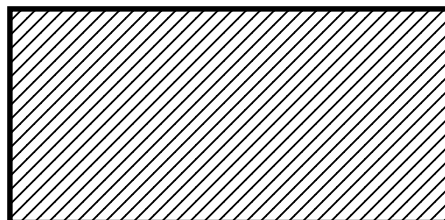
- Power switch.
- SHV female connector for detector bias.
- 2.5mm power jack.
- Fuse housing.
- 9-pin D female preamplifier power connector
- 9-pin D male RS-232 connector
- 15-pin D female pulse reset preamplifier interface
- 26 Pin D Female Connector for ROI Output
- 9-pin D auxiliary I/O connector
- Ethernet interface connector (RJ-45)
- Pole-zero adjustment on/off
- Pole-zero oscilloscope monitor switch
- One potentiometer for PZ adjustment of each shaping time (3 total)
- Single-ended Input from detector preamplifier (BNC)
- Differential input from detector preamplifier (BNC)
- Amplifier output (BNC)
- ADC input (BNC) 0-10V unipolar or bipolar pulse
- ADC gate input (BNC) (coin. / anti-coin. / off) CMOS/TTL
- Pile-up Reject input (BNC) CMOS/TTL
- Amp Busy input for ext. amp. live-time corr. (BNC) CMOS/TTL
- SCA output CMOS/TTL
- Peak Detect output (BNC) CMOS/TTL
- ADC Busy out (BNC) CMOS/TTL
- External input for alarm and/or auto-shutdown (CMOS/TTL)

## • Software

- 32-bit Quantum MCA compatible with MS-Windows 95/98/XP
- 32-bit Excalibur software option for quantitative analysis, compatible with MS-Windows 95/98/XP.

## • Power Requirement

- 10-18 VDC, 18 Watts, external.
- 12V with the universal AC power converter provided.



## For More Information Contact:

**Princeton Gamma-Tech, Inc.**  
1026 Rt. 518  
Rocky Hill, NJ 08553  
Tel: (609) 924-7310  
Fax: (609) 924-1729  
Web Site: [www.pgt.com](http://www.pgt.com)  
e-mail: [nuclearsales@pgt.com](mailto:nuclearsales@pgt.com)

